Ar 5/7

Armed Services Pricing Manual

(ASPM)

Department of Defense
1986

D1.6/2:

Armed Services Pricing Manual

(ASPM)

NEWARK PUBLIC LIBRARY
JUL 18 1986
U. S. GOVT. PUBS.
DEPOSITORY 376

Department of Defense
1986

S/N 008-000-00457-9 $17.00

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, DC 20402

FOREWORD

The Armed Services Pricing Manual is issued by direction of the Assistant Secretary of Defense (Acquisition and Logistics) pursuant to the authority contained in Department of Defense Directive No. 5128.1 dated July 5, 1985.

The manual is published for the guidance of Department of Defense personnel engaged in the analysis and negotiation of contract prices. It is the first volume of what ultimately will be a two-volume set. A price analysis handbook is being developed.

This volume contains instructional material dealing with the whole range of contract pricing and is based on the policies and procedures of the Federal Acquisition Regulation (FAR) and the DoD FAR Supplement (DFARS). It uses detailed discussions and examples to illustrate the application of pricing policy to pricing problems, but it is not directive. The manual is to be used for training, both in classrooms and on the job. It is also to be used as a handbook.

This edition supersedes the revised manual dated 14 September 1975. The manual has been redesigned to enhance its utility. In total, the changes are so extensive that the manual should be treated as a new publication and reread and restudied.

Copies of this manual may be purchased from the Superintendent of Documents, Attention: Mail List Section, U.S. Government Printing Office, Washington, DC 20402.

READEX FICHE best copy available

ARMED SERVICES PRICING MANUAL

TABLE OF CONTENTS

PAGE

FOREWORD iii

CHAPTER 1 THE PROCUREMENT PROCESS AND CONTRACT PRICING

1.1 Role of This Manual 1- 1
1.2 Organization of This Manual 1- 2
1.3 Objectives and Responsibilities in the Procurement Process 1- 3
1.4 Pricing in the Procurement Process 1- 4
1.5 Procurement Procedures and Pricing 1- 8
1.6 Pricing Dogma 1- 9
1.7 Price and Pricing Arrangements 1-10
1.8 Why Analyze Prices? 1-32
1.9 Prospective and Retroactive Pricing 1-33

CHAPTER 2 PRICES AND PRICE ANALYSIS

2.1 Price Theory 2- 1
2.2 Different Views of Price 2- 3
2.3 Standards for Judging Price 2- 4
2.4 Competition 2- 4
2.5 Fair and Reasonable Price 2- 6
2.6 Price Analysis 2- 7
2.7 Testing for Competition 2- 9
2.8 Established Catalog or Market Prices 2-11
2.9 Techniques 2-12
2.10 Specific Guidance 2-16

CHAPTER 3 COSTS AND COST ANALYSIS

3.1 Cost Defined 3- 2
3.2 Cost-Based Prices 3- 3
3.3 Contract Cost Principles 3- 5
3.4 Contract Cost Analysis Defined 3- 5
3.5 Realistic Pricing 3- 6
3.6 Cost Accounting 3- 7
3.7 Cost Estimating 3-10
3.8 Sources of Cost or Pricing Data 3-14
3.9 Estimating Techniques and Tools for Quantitative Measurements . . . 3-15
3.10 Contract Pricing Proposals 3-34
3.11 Cost Analysis 3-43

CHAPTER 4 PROFIT ANALYSIS

4.1 Pricing Policy and Profit Objectives . . . 4- 1
4.2 Introduction to Weighted Guidelines . . . 4- 2
4.3 Contractor Effort . . . 4- 4
4.4 Contractor Risk . . . 4-11
4.5 Facilities Capital Employed . . . 4-14
4.6 Special Factors . . . 4-14
4.7 Documentation . . . 4-19
4.8 Statutory Limitations . . . 4-20

CHAPTER 5 HOW TO ANALYZE DIRECT COSTS

5.1 Materials . . . 5- 1
5.2 Factory Labor . . . 5-29
5.3 Engineering Labor . . . 5-46
5.4 Tooling . . . 5-57
5.5 Other Costs . . . 5-59

CHAPTER 6 HOW TO ANALYZE INDIRECT COSTS

6.1 Definitions . . . 6- 2
6.2 Indirect Cost Information . . . 6- 3
6.3 Overhead Examples . . . 6- 5
6.4 Certified Cost or Pricing Data . . . 6-17
6.5 Importance of Indirect Cost Pools . . . 6-18
6.6 Indirect Cost Behavior . . . 6-19
6.7 Budgeting and Controlling Indirect Costs . . . 6-23
6.8 Factory Overhead . . . 6-26
6.9 Engineering Overhead . . . 6-29
6.10 General and Administrative (G&A) Expenses . . . 6-29
6.11 Independent Research and Development and Bid and Proposal Costs . . . 6-30
6.12 Selling Expense . . . 6-31
6.13 Volume Projections . . . 6-31
6.14 Indirect Cost Projections . . . 6-32
6.15 Teamwork . . . 6-33

CHAPTER 7 HOW TO ANALYZE LABOR RATES

7.1 Developing Wage Rates . . . 7- 1
7.2 Projections . . . 7- 3
7.3 Factors Modifying Wage-Rate Projections . . . 7- 6
7.4 Use of Graphic and Computational Analysis . . . 7- 7

CHAPTER 8 HOW TO NEGOTIATE AND JUSTIFY A PRICE

8.1 Competition and Price Negotiation . . . 8- 1
8.2 Written or Oral Discussions and Competitive Range . . . 8- 2
8.3 Price Negotiation Defined . . . 8- 4
8.4 Principles and Techniques . . . 8- 5
8.5 Negotiation . . . 8-12
8.6 The Need for Documentation . . . 8-19
8.7 Documenting Price Analysis . . . 8-20
8.8 Documenting Larger Procurements . . . 8-21

CHAPTER 9 SPECIAL PRICING TASKS

9.1 Catalog or Market Price Exemption 9- 2
9.2 Spare Parts 9-11
9.3 Warranties 9-25
9.4 Pricing Procurements for Foreign Military Sales 9-26
9.5 Pricing Data Items on the DD Form 1423 9-29

CHAPTER 10 POSTAWARD PRICING ACTIONS

10.1 Contract Changes 10- 2
10.2 Interim Pricing 10- 9
10.3 Final Pricing 10-15
10.4 Miscellaneous 10-24

APPENDIX A LIST OF ACRONYMS
APPENDIX B GLOSSARY

CHAPTER 1

The Procurement Process and Contract Pricing

CHAPTER 1

THE PROCUREMENT PROCESS AND CONTRACT PRICING

CONTENTS

1.1 Role of This Manual 1- 1

1.2 Organization of This Manual 1- 2

1.3 Objectives and Responsibilities in the Procurement Process 1- 3

1.4 Pricing in the Procurement Process 1- 4

1.5 Procurement Procedures and Pricing 1- 8

1.6 Pricing Dogma 1- 9

1.7 Price and Pricing Arrangements 1-10
- Significance of pricing arrangements 1-10
- Pricing arrangements 1-12
- Pricing ceilings 1-30
- Pricing arrangements as control mechanisms 1-31

1.8 Why Analyze Prices? 1-32

1.9 Prospective and Retroactive Pricing 1-33

1.1 Role of This Manual

To be competent in contract pricing, you must understand its concepts and practices and be adept at using sophisticated techniques often drawn from other arts and sciences. The Federal Acquisition Regulation (FAR) and the Department of Defense FAR Supplement (DFARS) state the policies and rules that govern contract pricing. This manual examines the conceptual and philosophical bases for those policies. It sets forth principles, tools, and techniques for estimating and evaluating costs, profits, and prices. It tells how to analyze direct and indirect costs, how to negotiate agreements on prices and pricing arrangements, and how to handle various specialized pricing tasks.

The manual conforms to Department of Defense (DoD) policies in effect at the time of publication, but procurement is a dynamic field. Policies will continue to change to reflect new laws, new concepts, and lessons learned from past events. If this happens and the change brings the manual into conflict with the regulations, the regulations govern.

The concepts discussed in Chapters 1 through 4 are fundamental and useful in all prime contract pricing situations and for contractor pricing of subcontracts as well. The techniques covered in those chapters and the "how to" guidance in Chapters 5 through 8 are as complete as we can make them.

These techniques were developed in response to particular problems in buying certain items from certain contractors or certain industries. As such, the techniques may lack universality and they most certainly do not represent the ultimate. However, the art of contract pricing still is evolving, and we expect the practitioners of that art to continue developing new techniques and new insights. Many of the individual subjects of this manual are explored in greater, more scholarly detail in other works. Some of these sources are cited in the selected readings listed at the end of certain chapters.

We intend this publication to be useful to people in base, post, or station (local purchase) as well as central procurement, to buyers of nuts and bolts as well as submarines and missiles, to service and agency buying personnel as well as contract administration and audit personnel. National Aeronautics and Space Administration (NASA) and nondefense procurement personnel also will find much that relates to their jobs.

In trying to be all things to all these people, we cannot always use the right words or examples. This puts a burden on you to take the sense of what is said and put it into terms and situations that you find meaningful. In short, the usefulness of this publication ultimately depends upon the extent to which you can apply its ideas to familiar objects and situations.

We do not expect you to become expert by reading this manual. We expect you to read, think about it, and reread as necessary. We expect the manual to be used in pricing training, in seminars, for home study, and as a reference on the job. We think trainees can use and understand it, and we also believe it fits the needs of an experienced person who regularly prices major systems. Those who work on the periphery -- supervisors, managers, technical specialists, inspectors general, internal auditors, and others -- will find that a reading will increase understanding of the pricing function.

1.2 Organization of This Manual

This edition of the manual has 10 chapters. Chapter 2 is devoted to the concepts and tools of pricing and price analysis. Chapter 3 deals with cost concepts and definitions and with the techniques of cost analysis. Chapter 4 covers profit analysis, and the remaining six chapters put the concepts, tools, and techniques to work.

Chapter 2 discusses price theory and the important role that competition plays in procurement and pricing policies. It also discusses the fair and reasonable price and price analysis. Chapter 3 discusses cost-based pricing, cost analysis, cost accounting and estimating, and the source of cost or pricing data. There is a segment on price index numbers, statistical analysis techniques, and other tools for quantitative measurement, and a section on contract pricing proposals submitted on Standard Form 1411.

Chapter 3 deals also with the techniques of cost analysis and with P.L. 87-653 and its implementation. Chapter 4 deals with profit analysis and the weighted guidelines. The next, Chapter 5, tells how to analyze the direct cost elements of materials, labor, tooling, and other direct costs. Chapter 6 deals with how to analyze indirect costs, and Chapter 7 discusses how to analyze labor rates.

Chapter 8 covers how to negotiate and justify a pricing arrangement. Chapter 9 tells how to do certain special pricing tasks -- the catalog and market price exemptions, spare parts, warranties, procurements for foreign military sales, and data items. Chapter 10 deals with things that require action after contract award -- changes, forward pricing factors, final overhead rates, option pricing, interim price adjustments, defective pricing, contract closeouts, fixed-price incentive settlements, residual inventories, terminations, cost accounting standards, and monitoring indirect costs.

FAR and DFARS and certain texts and reference works are cited at the end of most chapters as "suggested readings." There also are two appendices. The first is a list of acronyms and what they mean. The second is a glossary of terms commonly associated with contract pricing and with the overall procurement process.

1.3 Objectives and Responsibilities in the Procurement Process

The objective of the procurement process is to acquire supplies and services of the desired quality, in a timely manner, at fair and reasonable prices. Within this framework, the objective of contract pricing is to establish and administer an arrangement that pays a fair and reasonable price upon delivery of a product or service. A fair and reasonable price is one that is fair to both parties to the contract, considering the quality and timeliness of contract performance.

In this manual, we use "contracting officer" or its synonym, "buyer," in describing who does what. But much of what is done in a buying activity is done by others in the name of the actual contracting officer who ultimately approves and signs the papers. Consequently, when we say "contracting officer" or "buyer," we are speaking of the people who perform the function, and not necessarily of a particular individual, unless the context clearly indicates otherwise.

You, the contracting officer, are responsible for the pricing arrangement. How you discharge this responsibility depends on the requirement, the procurement situation, the organization, and your abilities. Relatively few of you deal with complex systems, including associated support equipment, components, and services. Most of you handle seemingly less complex requirements, but your goal is the same -- quality and timeliness at fair and reasonable prices -- and the pricing task may be even more difficult. Procurement of new, complex, and costly products, support equipment, and services requires a high degree of skill in contract pricing, and these pricing tasks usually are accomplished by a team of specialists. The public trust demands this same skill in all procurements, whether done by an individual or by a team of specialists.

If a buy can be made using just price analysis, you usually will do the pricing job unassisted by specialists. As a result, we expect you to know about available sources, past prices and quantities, delivery and production schedules, specifications, market prices, discounts, terms of sale, and quality, including the acceptability of past purchases to users. We also expect you to know as much as possible about what you are buying, to learn by examining the product, by looking at a picture of it, or by talking about it with someone who does know. We know that this background knowledge and experience cannot be acquired all at once for every single thing you buy, but we expect you to work hard to acquire it.

In circumstances involving costly, technically complex, or unique requirements, you should be able to get specialized pricing help. However, no matter how much help you get in pricing, you are the one answerable for the quality of the pricing arrangement. This statement of the contracting officer's responsibility is made in the context of legal responsibility as an agent of the Government.

In addition, other people have definite organizational and job responsibilities. Organizationally, and in terms of personal job responsibility, all who specialize in price or cost analysis, or in negotiation, and who help the contracting officer in one of these roles, are responsible for the quality, completeness, and timeliness of that help.

You, the contracting officer, cannot pass this responsibility on, even when you rely on others for information and technical advice. You must evaluate the quality of the assistance you receive and the reliability of those who provide it.

From time to time, you may have to accept help at face value, having neither the time nor the knowledge to evaluate the job done by specialists. Should their information be erroneous or incomplete, the failure is charged to the specialists who did the work, and not to you who used it. If the fault lies with *how* the information was used, however, that failure can be yours. Therefore, this manual is meant for the contracting officer as much as for the pricing specialist.

1.4 Pricing in the Procurement Process

Although contract pricing is a procurement function, its success depends heavily upon the actions taken by requirements and technical organizations and people. Where it is a separate function, it will be staffed to give the contracting officer prompt and complete support, including assistance in price negotiations.

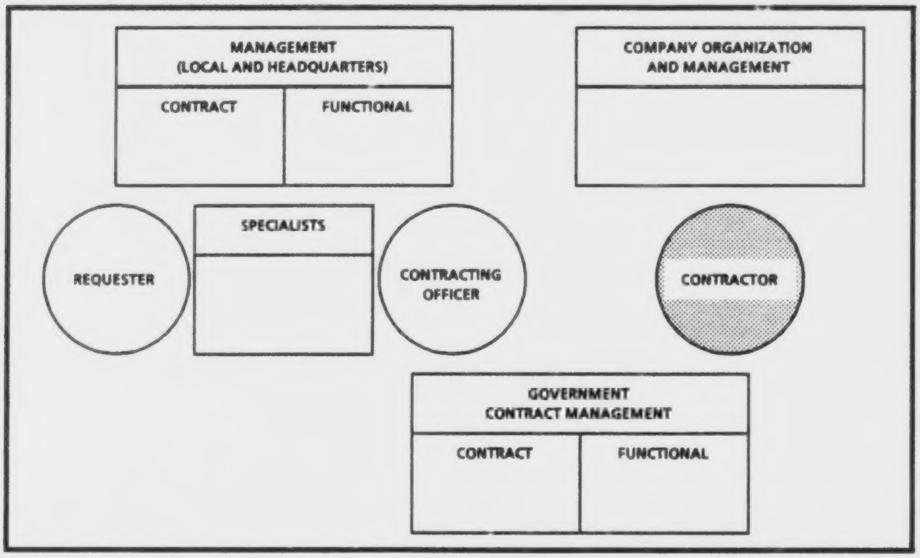
Contract pricing is the function that gathers, assimilates, evaluates, and, in establishing objectives, brings to bear all the skills and techniques needed to shape the eventual pricing arrangement. Pricing services include price analysis, cost analysis, and use of accounting and technical evaluations and systems analysis techniques to facilitate negotiation of realistic pricing arrangements.

Figures 1-1 through 1-8 depict the organizations, people, and actions in the procurement process from the identification of a need to the award of a negotiated contract. For clarity, the figures depict the process as it exists with a single contractor, even though most procurements will involve competing companies. In that event, source selection would be another step in the process.

The requester (the one who has the need), the contracting officer, and the contractor's representative are the three principals. Our focus will be on the contracting officer. Both the contracting officer and the contractor's representative are supported at various times in different ways by their organizations and by functional specialists, and both are subject, at any time, to reviews and audits unrelated to the contract action at hand. Also, the contracting officer works under the surveillance of a higher echelon.

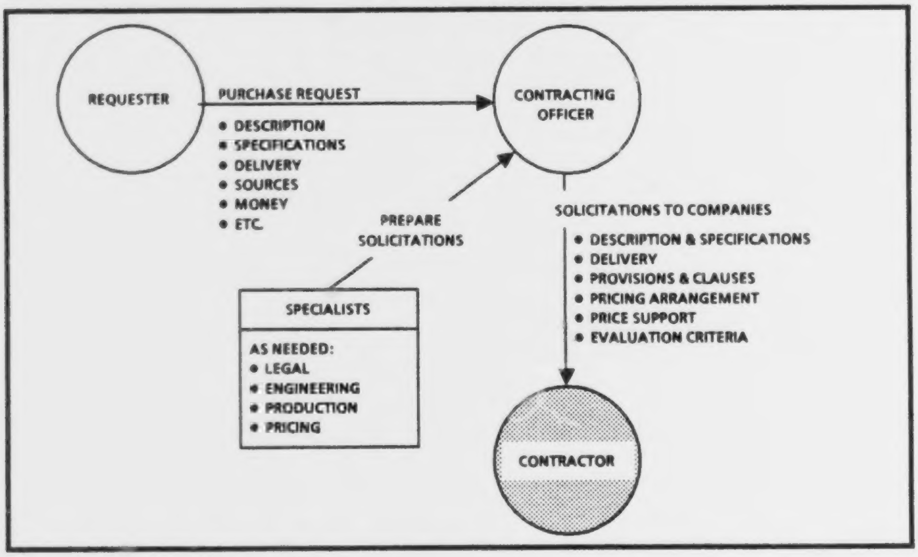
Figure 1-1 shows the cast of characters.

FIGURE 1-1. ORGANIZATION AND PEOPLE


MANAGEMENT (LOCAL AND HEADQUARTERS)
CONTRACT
FUNCTIONAL
COMPANY ORGANIZATION AND MANAGEMENT
REQUESTER
SPECIALISTS
CONTRACTING OFFICER
CONTRACTOR
GOVERNMENT CONTRACT MANAGEMENT
CONTRACT
FUNCTIONAL

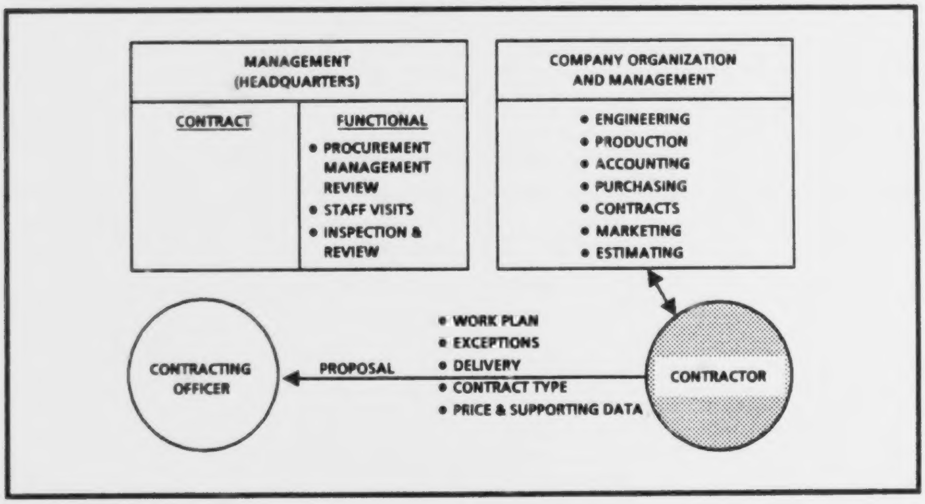
In Step 1 (Figure 1-2), the contracting officer, using specialists as needed, converts a purchase request from the requiring organization into a solicitation asking contractors for proposals.

FIGURE 1-2. STEP 1


REQUESTER
PURCHASE REQUEST
• DESCRIPTION
• SPECIFICATIONS
• DELIVERY
• SOURCES
• MONEY
• ETC.
CONTRACTING OFFICER
PREPARE SOLICITATIONS
SPECIALISTS
AS NEEDED:
• LEGAL
• ENGINEERING
• PRODUCTION
• PRICING
SOLICITATIONS TO COMPANIES
• DESCRIPTION & SPECIFICATIONS
• DELIVERY
• PROVISIONS & CLAUSES
• PRICING ARRANGEMENT
• PRICE SUPPORT
• EVALUATION CRITERIA
CONTRACTOR

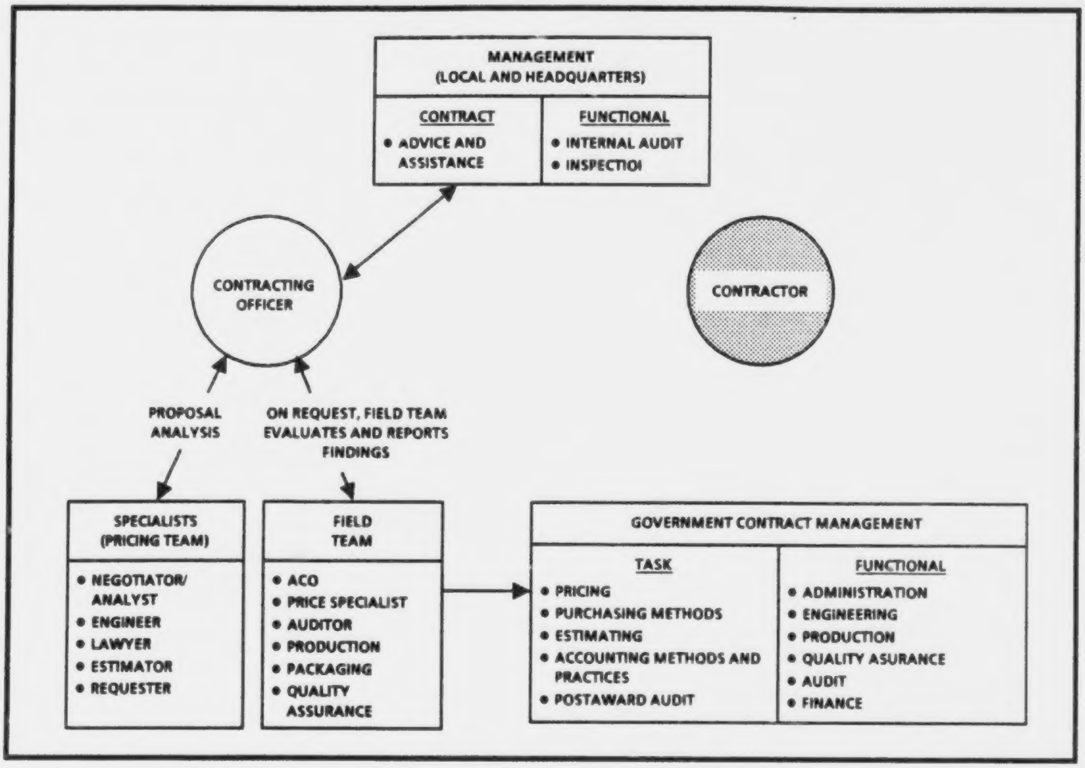
In Step 2 (Figure 1-3), a contractor prepares and submits a proposal to the contracting officer.

FIGURE 1-3. STEP 2


MANAGEMENT (HEADQUARTERS)
CONTRACT
FUNCTIONAL
• PROCUREMENT MANAGEMENT REVIEW
• STAFF VISITS
• INSPECTION & REVIEW
COMPANY ORGANIZATION AND MANAGEMENT
• ENGINEERING
• PRODUCTION
• ACCOUNTING
• PURCHASING
• CONTRACTS
• MARKETING
• ESTIMATING
CONTRACTING OFFICER
PROPOSAL
• WORK PLAN
• EXCEPTIONS
• DELIVERY
• CONTRACT TYPE
• PRICE & SUPPORTING DATA
CONTRACTOR

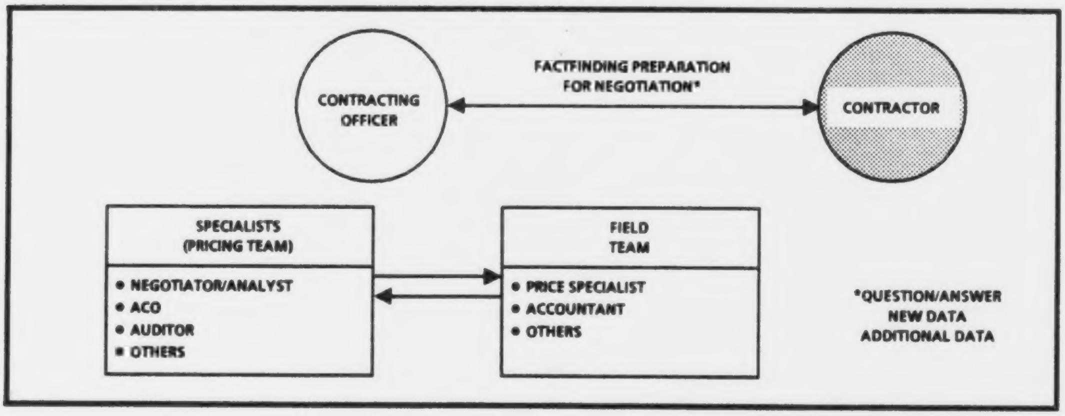
Step 3 (Figure 1-4) is the analysis of the contractor's proposal. The contracting officer uses a team of specialists at the buying office and a team from the contract administration and audit organizations. The contracting officer may ask for advice and assistance from management, both local and headquarters, and may get involved with departmental inspectors and General Accounting Office (GAO) auditors at this or any other step of the process with regard to earlier procurements or audit programs on specific topics.

FIGURE 1-4. STEP 3


MANAGEMENT
(LOCAL AND HEADQUARTERS)
CONTRACT
• ADVICE AND ASSISTANCE
FUNCTIONAL
• INTERNAL AUDIT
• INSPECTIOI
CONTRACTING OFFICER
CONTRACTOR
PROPOSAL ANALYSIS
ON REQUEST, FIELD TEAM EVALUATES AND REPORTS FINDINGS
SPECIALISTS (PRICING TEAM)
• NEGOTIATOR/ ANALYST
• ENGINEER
• LAWYER
• ESTIMATOR
• REQUESTER
FIELD TEAM
• ACO
• PRICE SPECIALIST
• AUDITOR
• PRODUCTION
• PACKAGING
• QUALITY ASSURANCE
GOVERNMENT CONTRACT MANAGEMENT
TASK
• PRICING
• PURCHASING METHODS
• ESTIMATING
• ACCOUNTING METHODS AND PRACTICES
• POSTAWARD AUDIT
FUNCTIONAL
• ADMINISTRATION
• ENGINEERING
• PRODUCTION
• QUALITY ASURANCE
• AUDIT
• FINANCE

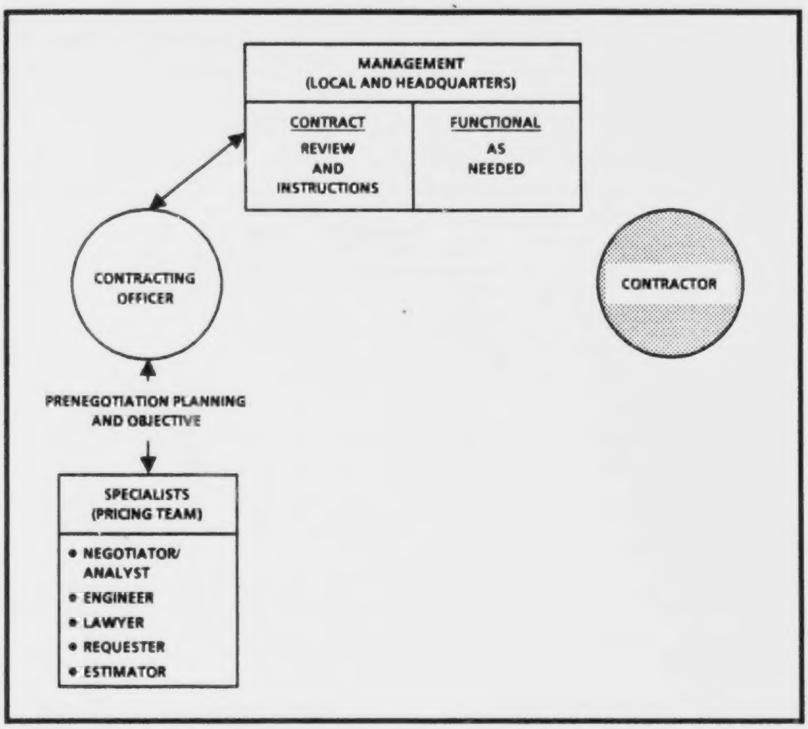
In Step 4 (Figure 1-5), the contracting officer, using the specialists and the field team as needed, seeks both to assimilate new data and to resolve with the contractor all questions about the facts that support the proposals.

FIGURE 1-5. STEP 4


CONTRACTING OFFICER
FACTFINDING PREPARATION FOR NEGOTIATION*
CONTRACTOR
SPECIALISTS (PRICING TEAM)
• NEGOTIATOR/ANALYST
• ACO
• AUDITOR
• OTHERS
FIELD TEAM
• PRICE SPECIALIST
• ACCOUNTANT
• OTHERS
*QUESTION/ANSWER
NEW DATA
ADDITIONAL DATA

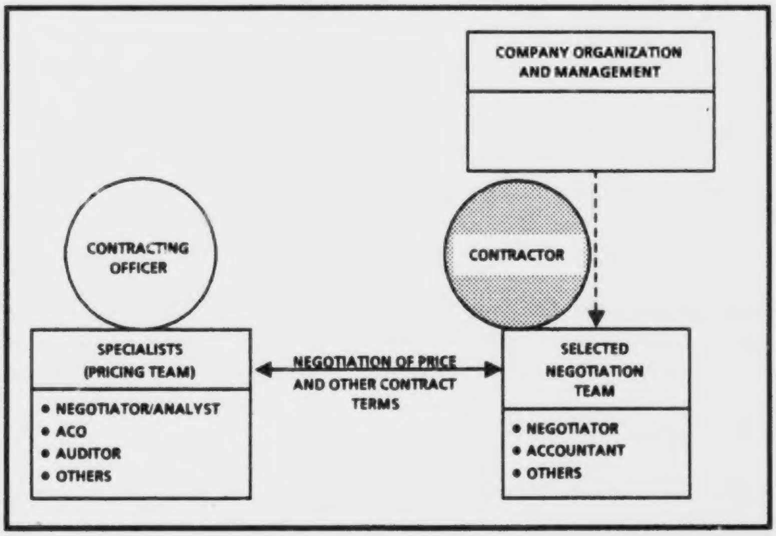
When factfinding is completed, the contracting officer gets ready for the negotiation, receives instructions from management, assembles specialists, and plans negotiation strategies (Step 5, Figure 1-6).

FIGURE 1-6. STEP 5


MANAGEMENT (LOCAL AND HEADQUARTERS)
CONTRACT
REVIEW AND INSTRUCTIONS
FUNCTIONAL
AS NEEDED
CONTRACTING OFFICER
CONTRACTOR
PRENEGOTIATION PLANNING AND OBJECTIVE
SPECIALISTS (PRICING TEAM)
• NEGOTIATOR/ ANALYST
• ENGINEER
• LAWYER
• REQUESTER
• ESTIMATOR

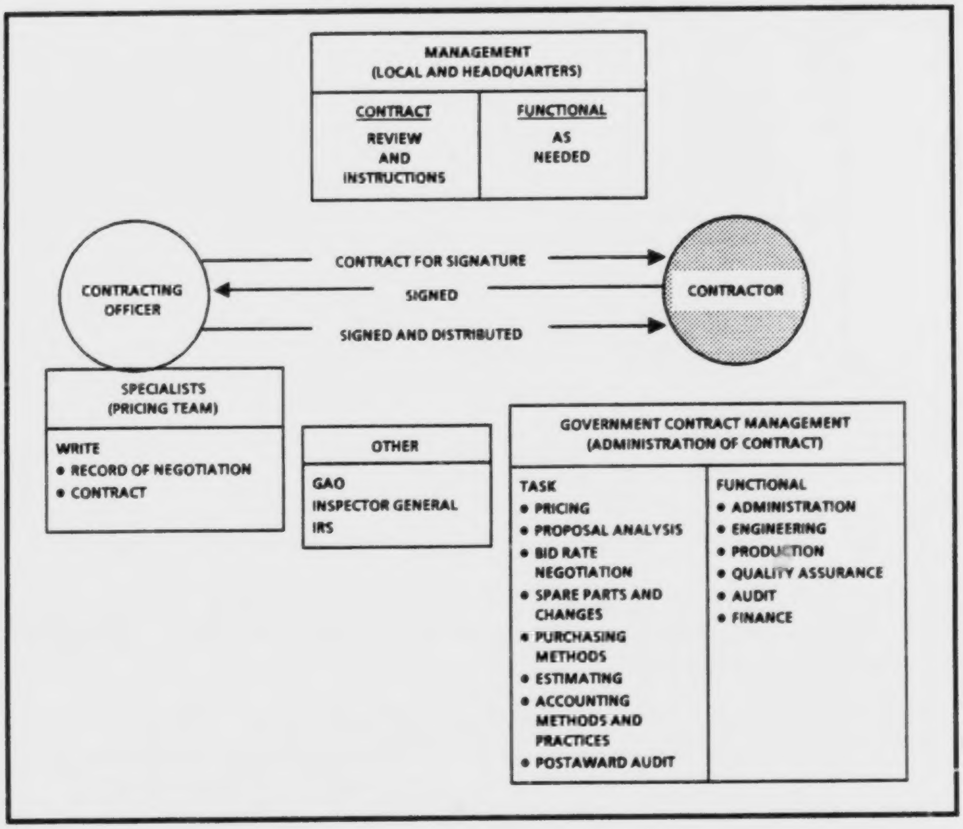
Step 6 (Figure 1-7) is the negotiation with the contractor. Both sides rely upon the help of specialists. This is the bargaining session in which agreement is reached on a pricing arrangement and all other terms of the contract.

FIGURE 1-7. STEP 6


COMPANY ORGANIZATION AND MANAGEMENT
CONTRACTING OFFICER
CONTRACTOR
SPECIALISTS (PRICING TEAM)
• NEGOTIATOR/ANALYST
• ACO
• AUDITOR
• OTHERS
NEGOTIATION OF PRICE AND OTHER CONTRACT TERMS
SELECTED NEGOTIATION TEAM
• NEGOTIATOR
• ACCOUNTANT
• OTHERS

The final step (Figure 1-8) includes reducing the agreement to writing, submitting the contract for required reviews and approvals, and signing and distributing the document. The contractor starts work and the contract is administered by the contract management organization. In addition to specific tasks related to the contract, the field organizations have responsibility for continuing review of the contractor's accounting, estimating, and purchasing operations. Other parts of the Federal Government (such as GAO and Internal Revenue Service) also may be looking at the contractor's operations.

FIGURE 1-8. FINAL STEP


MANAGEMENT (LOCAL AND HEADQUARTERS)
CONTRACT
REVIEW AND INSTRUCTIONS
FUNCTIONAL
AS NEEDED
CONTRACTING OFFICER
CONTRACT FOR SIGNATURE
SIGNED
SIGNED AND DISTRIBUTED
CONTRACTOR
SPECIALISTS (PRICING TEAM)
WRITE
• RECORD OF NEGOTIATION
• CONTRACT
OTHER
GAO
INSPECTOR GENERAL
IRS
GOVERNMENT CONTRACT MANAGEMENT (ADMINISTRATION OF CONTRACT)
TASK
• PRICING
• PROPOSAL ANALYSIS
• BID RATE NEGOTIATION
• SPARE PARTS AND CHANGES
• PURCHASING METHODS
• ESTIMATING
• ACCOUNTING METHODS AND PRACTICES
• POSTAWARD AUDIT
FUNCTIONAL
• ADMINISTRATION
• ENGINEERING
• PRODUCTION
• QUALITY ASSURANCE
• AUDIT
• FINANCE

1.5 Procurement Procedures and Pricing

Federal procurement procedures underwent significant change in 1984-85 when new laws clarifying the role and forms of competition went into effect. The previous preference for formal advertising over negotiation gave way to a preference for "full and open competition."

As a result of congressional action, 10 U.S.C. 2304 and 41 U.S.C. 253 were amended to require contracting officers to promote and provide for full and open competition in soliciting offers and awarding contracts. There are seven exceptions to this requirement, as follows:

a. Only one responsible source.

b. Unusual and compelling urgency.

c. Industrial mobilization; or experimental, developmental, or research work.

d. International agreement.

e. Authorized or required by statute.

f. National security.

g. Public interest.

Two kinds of solicitations are equally acceptable: invitations for bids (IFBs), for sealed bidding, and requests for proposals (RFPs), for negotiation.

In general, an IFB is appropriate when descriptions and specifications are clearly defined and complete, no discussions are required, enough potential offerors are available to ensure competition, and a firm-fixed-price (FFP) contract can be used.

If specifications and purchase descriptions are not clearly defined and complete but the other prerequisites for sealed bidding are generally met, a modification of sealed bidding, called "two-step sealed bidding," may be used. Step one consists of submission and discussion of technical proposals. Step two consists of submission of sealed, priced bids by those whose technical proposals have been found acceptable.

In sealed bidding, cost analysis is not required. The actions taken to determine whether competition is present and effective provide assurance that the price is fair and reasonable.

When IFBs are inappropriate, RFPs are used to communicate Government requirements to potential offerors and to solicit proposals to fill these requirements. When the Government accepts a proposal -- either as is (without discussion) or after negotiation -- a binding contract is created. RFPs are also used in other than competitive situations, when award of a contract to a predetermined offeror has been justified under one of the seven exceptions to the requirement for competition.

When competitive procedures are used and multiple responsible and independent offers are received, contracts may be awarded without cost analysis if price analysis clearly demonstrates that the proposed price is reasonable. In the absence of competition, both price and cost analysis may be needed.

1.6 Pricing Dogma

Proposal analysis, prenegotiation planning, negotiation, and documentation are parts of the procurement process. The techniques of price and cost analysis are the first steps in evaluating the company's price proposal. The company is the principal source of the information needed to evaluate the proposal. However, where several potential sources are competing for the award or where the price has been set in the marketplace, competing offers and sales literature are sources of information that can be used in price analysis. Where cost analysis must be used, the starting point is the cost or pricing data furnished by an offeror or contractor.

Cost or pricing data are the factual portions of the proposal or the facts upon which the proposal is based; they are the parts that can be verified. Usually they can be verified from accounting records and other supporting documents. It is this accounting review that is the popular conception of cost analysis and, while there is more than accounting review to cost analysis, it is one of the three analytical skills required for contract pricing. The other two are technical analysis and price analysis.

Accounting analysis requires access to a company's books and accounting records to verify that the costs used as the base points in forecasting future activity are factually correct. This accounting analysis also may require exploration and verification of the costs of other companies doing the same or similar work. The purpose is to develop comparable data to help in determining the reasonableness of, and necessity for, costs supporting a given proposal.

Accounting analysis is not the total of all cost analysis effort. The contributions of experts in manufacturing techniques, tool design, plant layout, industrial and other engineering fields, quality assurance, and preservation packaging also constitute forms of cost analysis. These experts often can give a qualitative evaluation of incurred and projected costs in special areas to help determine what the cost should be.

Price analysis is the other skill; it consists of all the many things you may do to make a decision about the price proposed by the offeror or contractor. You may be able to make a price decision using price analysis alone, but you cannot make an equally sound decision by relying solely on accounting and technical analyses of the proposed cost. In other words, you must use price analysis on every procurement.

While you might conclude that cost analysis is performed only by contract auditors or technical specialists, don't; you would be wrong. Anyone who evaluates a contractor's proposal by examining individual elements of cost is performing cost analysis. In a typical situation, several individuals will look at a contractor's proposal (or a company's offer), each from a particular vantage point -- accounting, engineering, production, purchasing, estimating -- and each reporting what he sees.

Like the blind men and the elephant, no one sees the whole animal, but each draws some conclusion, based on examination of his own set of facts, as to the nature of the beast. Someone has to take these separate observations, put them together with any other information bearing on the procurement, and make a decision about the price proposed. This someone is the contracting officer or someone working for the contracting officer. The putting-together to make the decision is called pricing, and the skill is called price analysis.

1.7 Price and Pricing Arrangements

Price is the money the Government pays a contractor for the delivery of a product or the performance of a service. Contract pricing is a series of actions in getting to a written agreement on the pricing arrangement and then administering that arrangement to the extent required. The arrangement agreed upon may specify a price that is firm from the outset or, because of uncertainty, that is set tentatively at the start and made subject to change during or at the end of the contract. If uncertainties are very great, the arrangement may not include a price at all. Instead, the Government may agree to reimburse the contractor for monies expended (subject to certain restrictions) and, generally, to pay the contractor a fee for doing the work.

No matter how structured, prices are of great importance to a contractor because they provide the economic base for operations. The pricing arrangement also is important because it has the potential for translating a company's profit aspirations into a monetary reward based on the quality of performance.

Significance of pricing arrangements

The contracts authorized for use are categorized as either fixed-price or cost-reimbursement contracts. When combined with pricing terms, these are what we call pricing arrangements.

Fixed-price arrangements have in common an agreement by the contractor to deliver a product or perform a service in accordance with the terms and conditions of the contract and an agreement by the Government to pay a price equal to the firm price specified in the contract or, if the contract includes a tentative price subject to later adjustment, at no more than a specified ceiling.

In contrast, cost-reimbursement arrangements are agreements by the Government to reimburse contractors for monies expended, subject to certain restrictions and any special understandings negotiated. The parties agree to an estimate of total costs and the Government is not obligated to reimburse the contractor for costs incurred in excess of that estimated amount.

The contractor agrees to use its best efforts to complete contract requirements within the estimate, to notify the Government should there be reason to think that this will not happen, and at that time to give the Government a revised estimate of the cost for performing the contract. However, the contractor is not obligated to continue performance or otherwise incur reimbursable expenses in excess of the established estimate unless and until notified by the Government that the contract funding and the estimate have been increased.

From a pricing standpoint, the most significant difference between fixed-price and cost-reimbursement arrangements is the effect, if any, that actual costs of performance have on the obligations assumed by the contracting parties. Under any of the fixed-price arrangements, the actual costs incurred by the contractor have no effect on the agreement to deliver the product or perform the service required by the contract. The actual costs have no effect on the Government's agreement to pay a price equal to the firm price established or no more than the specified ceiling.

Therefore, the contractor's ability to avoid a loss or make a profit under the fixed-price arrangement is directly related to control of the costs of performance. In effect, the contractor assumes responsibility for these costs, with the exact degree of responsibility determined by the particular type of fixed-price arrangement negotiated.

Given the contractual obligations assumed, the ability and willingness of the parties to negotiate a fixed-price arrangement at a realistic level depends largely upon the performance uncertainties involved. Some uncertainty is present in any situation in which the price is set in advance of performance, but uncertainty doesn't rule out the use of a fixed-price arrangement. However, use of such an arrangement does imply an ability to identify the specific areas and degree of uncertainty. It also implies that these uncertainties are relatively few in number and that their occurrence during contract performance will not or should not jeopardize the contractor's ability to deliver the product or perform the service required by the contract.

Assuming performance uncertainties of the nature and extent just discussed, negotiation of a fixed-price arrangement may be both possible and appropriate. Selection from among the several authorized fixed-price arrangements will depend upon the degree to which the parties, after evaluating the available information, can agree on both the likelihood of these uncertainties occurring during performance and their possible cost impact.

In other situations, it is impossible to identify at the time of contract negotiations all the significant problems that could arise during contract performance and their potential cost and technical impact. Here, use of one of the cost-reimbursement arrangements may be necessary to protect the interests of both the Government and the contractor.

Under a cost-reimbursement arrangement, both the contractor's obligation to perform and the Government's obligation to reimburse the expenses of that performance are related to the level of actual costs incurred and the willingness of the Government to continue reimbursing the contractor for costs incurred in excess of established estimates.

In most situations involving the use of cost-reimbursement arrangements, the Government agrees not only to reimburse the contractor for monies expended, but also to pay the contractor a fee for doing the work. Three fee-bearing alternatives are authorized for use. One provides a fixed fee, one provides for a formula determination of fee, and one is an award arrangement. All three are discussed in this section.

The primary consideration in selecting from among these three should be the problems that make it necessary to adopt a cost-reimbursement approach. Unexpected events or problems during performance could alter or affect the areas of greatest concern to the Government. Among other factors, you'll need to evaluate the management approach, communications discipline, and degree of flexibility that may be required to identify and cope with these events and problems on a real-time basis.

This evaluation should help you decide whether to provide a fixed fee or whether it would be better to relate the amount of fee to the contractor's accomplishments under the contract. If you choose the second approach, the evaluation may help you decide whether this should be done in terms of predetermined targets and incentive formulas or on the basis of the periodic, judgmental assessments of ongoing performance.

Pricing arrangements

The following paragraphs introduce authorized pricing arrangements. They identify the principal arrangements and discuss the basic characteristics of each.

Some authorized arrangements are not covered in this section or elsewhere in this manual either because they are special arrangements with narrow applications or because they cannot be distinguished by pricing terms. The latter deal with procurement methods (indefinite delivery contracts, basic ordering agreements), administrative conveniences (basic agreements), and special authorizations to proceed with performance (letter contracts).

The judgment needed to develop a pricing arrangement must be fortified by evaluation of the extent and nature of performance uncertainties and the probable impact of contract requirements on the contract's ultimate price or cost. Using sealed bidding procedures, the choice is limited to firm-fixed-price (FFP) and fixed-price with economic price adjustment. For that reason, this section discusses pricing arrangements when competitive proposals and other than competitive procedures are used.

Before agreeing on a pricing arrangement, you need to determine whether the contractor's accounting system and methods will work for the specific arrangement you wish to negotiate and whether these methods permit timely development of the cost or pricing data required by the arrangement. This may be critical if the pricing arrangement requires a revision of prices while performance is in progress, as under fixed-price incentive (successive targets) (FPIS) and fixed-price with redetermination (FPR) arrangements.

In arrangements requiring interim revision, it may help to specify that the contractor will release items to production to coincide with the quantity or time break specified as the effective point of price revision. The contractor's accounting system also may be a critical factor if you want to use another kind of arrangement with a contractor whose previous experience has been FFP. Whenever you doubt the compatibility of the contractor's accounting system with the arrangement you plan to negotiate, check with the administrative contracting officer (ACO) and auditor.

You may combine authorized arrangements in order to create a contract that fits the procurement situation better. This means that a single contract might have, for example, both FFP and cost-plus-fixed-fee (CPFF) features. The proposed combination would have to meet the basic test of promoting the best interests of the Government. Beyond that, you would want assurance that the elements of work covered by the different pricing arrangements were distinctive and would be assigned to and managed by separate components of the company's organization. It also should follow that the combination would not cause problems that the company's cost accounting methods could not cope with; the costs of the different efforts must be segregated.

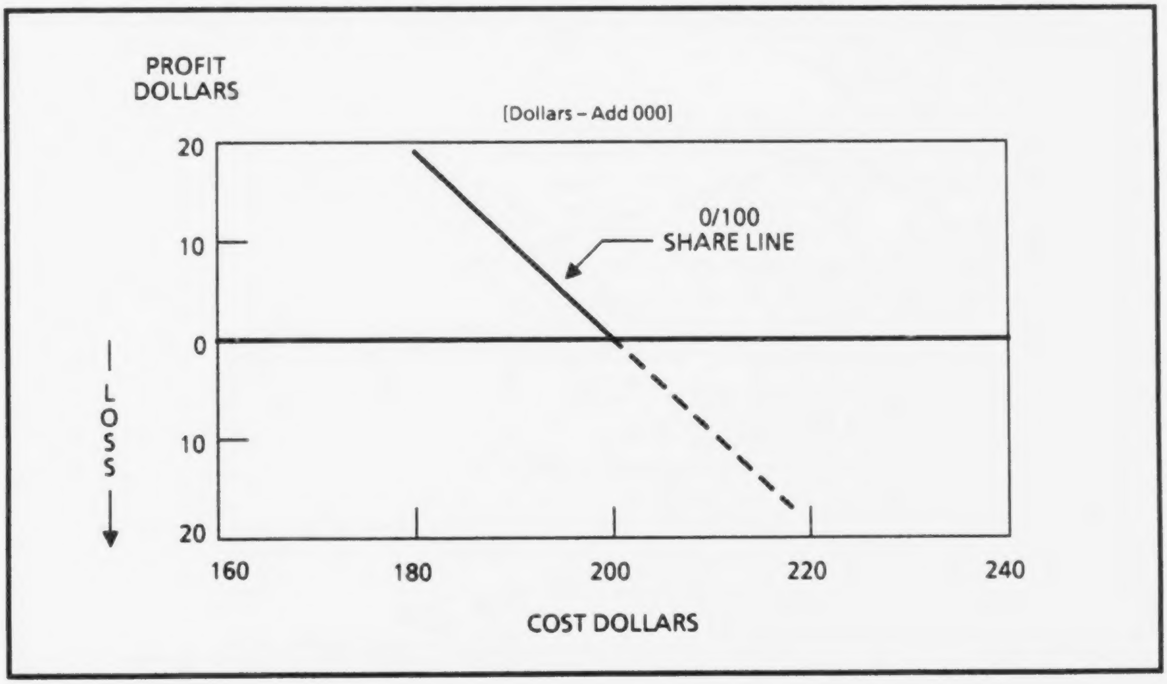
Firm-Fixed-Price (FFP)

Price is agreed to before a definitive contract is awarded. It remains firm for the life of the contract unless revised pursuant to the Changes clause in the contract. Because of this, a contractor accepts full cost responsibility with this type of contract. Examples are shown in Table 1-1 and Figure 1-9, a cost/profit chart.

TABLE 1-1

Contract Price	$200,000	$200,000	$200,000
Final cost	185,000	170,000	220,000
Profit realized	$ 15,000	$ 30,000	$ (20,000)

FIGURE 1-9. FFP ARRANGEMENT



In the terminology of an incentive contract, the sharing arrangement is 0/100. This means that the Government does not share at all and the contractor accepts 100 percent of any difference between estimated and actual costs. The contractor assumes complete responsibility, in the form of profits or losses, for all contract costs.

Fixed-Price Incentive (Firm Target) (FPIF)

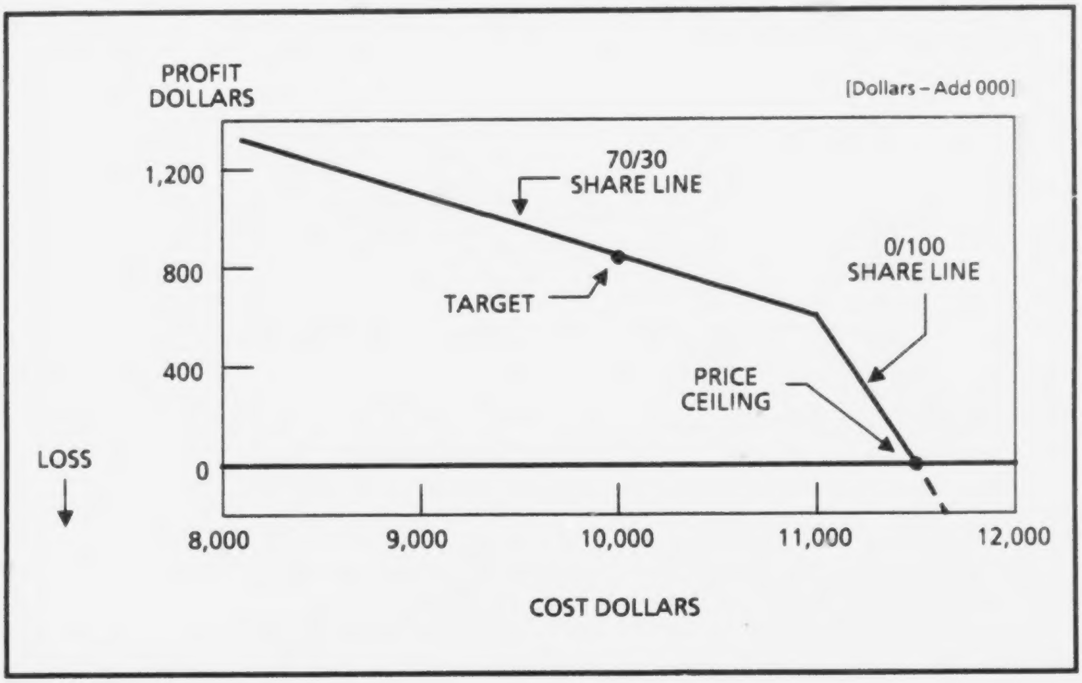
The ingredients of a fixed-price incentive with firm target (FPIF) from the outset are target cost, target profit, target price, price ceiling, and share arrangement (see Table 1-2).

TABLE 1-2

Target cost	$10,000,000
Target profit	850,000
Target price	10,850,000
Price ceiling	11,500,000
Share	70/30

Figure 1-10 illustrates this example. A firm pricing arrangement, such as the one shown here, is negotiated at the outset of the contract to provide the basis for negotiation of the final price.

FIGURE 1-10. FPIF ARRANGEMENT



When the contract is completed, the contractor submits a statement of costs incurred in performance of the contract. These are audited to determine allowability and allocability to the contract and to point out costs that may not have been needed to perform the contract or are otherwise questionable. These data, the contractor's statement and the auditor's advisory report, are the starting points in analyzing the proposal for final determination of contract price.

Except where contract changes have made it impossible, it can be useful to compare actual costs with those estimated at the time the target price was negotiated. Look at the original negotiation objective, as modified by subsequent changes, to identify and analyze the differences between expected and actual events. This will help you understand the problems the contractor had to solve and give you an indication of the degree to which the actual costs of contract performance were reasonable and necessary. You should evaluate engineering, production, and management control efforts, and your conclusions should become part of the negotiation objective. After you negotiate the final cost figure, apply the sharing formula to determine profit.

The 70/30 formula in the example states a joint responsibility for ultimate costs that is translated into a sharing in any dollar difference between target and final costs. In the example, this means that 30 cents of every dollar of difference is the contractor's responsibility, either as an addition to or a deduction from target profit. Although the shares will always total 100 percent, you should negotiate the proportions to reflect the uncertainties involved in contract performance, the amount of target profit, and the spread between target cost and price ceiling. Other expressions of Government/contractor shares are 60/40, 75/25, and 50/50.

It has been common practice to make the share line symmetrical, such as 70/30 both sides of target cost. Because contract terms must be tailored to the procurement situation, there is no need to negotiate straight share lines if uncertainties are not equal on both sides. Contracts with 50/50 or 60/40 shares under target can go with 80/20, 85/15, or 70/30 over target.

Using the arrangement from Table 1-2, assume that the final negotiated cost was $9,600,000 (Table 1-3).

TABLE 1-3

Target cost	$10,000,000
Final negotiated cost	9,600,000
Difference	$ 400,000 (decrease)

The contractor receives 30 percent or $120,000 of the $400,000 difference as an *increase* in profit (Table 1-4). The Government receives 70 percent or $280,000 of the $400,000 difference as a *reduction* in price (Table 1-5).

TABLE 1-4

Target profit	$850,000
Contractor's share	120,000
Final profit	$970,000

TABLE 1-5

Final negotiated cost	$9,600,000	
Final profit	970,000	
Final price		$10,570,000
Target price		10,850,000
Price reduction		$ 280,000

Again using the arrangement from the example, assume that the final negotiated cost was $10,500,000 (Table 1-6).

TABLE 1-6

Target cost	$10,000,000
Final negotiated cost	10,500,000
Difference	$ 500,000 (increase)

The contractor receives 30 percent or $150,000 of the $500,000 difference as a *decrease* in profit (Table 1-7). The Government receives 70 percent or $350,000 of the $500,000 difference as an *increase* in price (Table 1-8).

TABLE 1-7

Target profit	$850,000
Contractor's share	(150,000)
Final profit	$700,000

TABLE 1-8

Final negotiated cost	$10,500,000	
Final profit	700,000	
Final price		$11,200,000
Target price		10,850,000
Price increase		$ 350,000

Using the example again, assume that the final negotiated cost was $12,000,000, or $500,000 above the contract price ceiling. Whenever final costs exceed the ceiling, the ceiling amount becomes the final price. In this instance, the ceiling of $11,500,000 is the final price and the $500,000 is a loss.

In negotiating a fixed-price incentive (FPI) arrangement, you need to establish the interrelated factors of target cost, target profit, price ceiling, and sharing formula so that the contractor will have a degree of cost responsibility and incentive consistent with the circumstances.

For example, the greater the effort required to produce at a cost less than estimated, the greater the contractor's share should be. The possible reward must be greater to encourage the extra attention and effort needed to produce at a cost less than target. In such circumstances, you might negotiate an arrangement combining a tight target cost, a relatively high target profit, a large contractor share (like 60/40 or 50/50), at least on the underrun side, and a tight ceiling (like 117 percent of target cost).

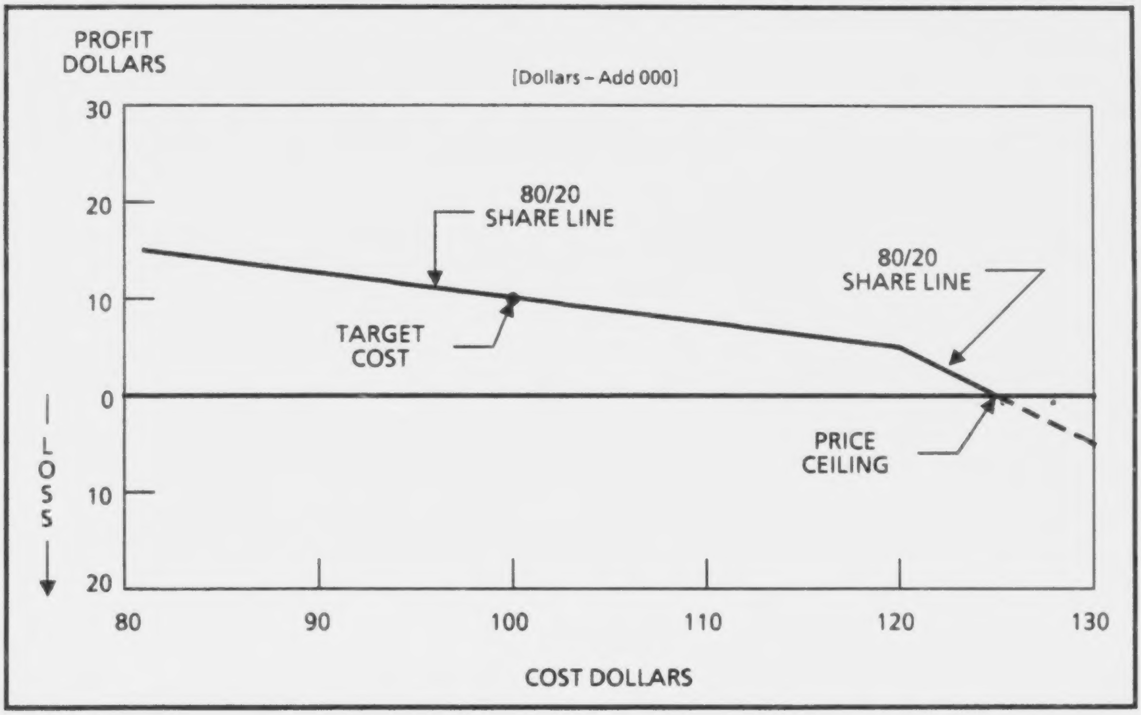
In addition, you must consider the effect of the mandatory price ceiling. The limit of Government/contractor sharing above target, at the share formula in the contract, is at some figure less than the price ceiling. Assuming a target cost of $100,000, a target profit of $10,000, an 80/20 sharing arrangement, and a price ceiling of $125,000, the following illustrations of final pricing demonstrate this point (Table 1-9).

TABLE 1-9

FINAL NEGOTIATED COST	DOLLARS IN EXCESS OF TARGET	CONTRACTOR'S SHARE	FINAL PROFIT	FINAL PRICE
$115,000	$15,000	$3,000	$7,000	$122,000
118,000	18,000	3,600	6,400	124,400
119,000	19,000	3,800	6,000	125,000

The final profit in the last case would have been $6,200, except that the mandatory price ceiling of $125,000 limits the total payment that can be made to the contractor. Figure 1-11 shows this.

FIGURE 1-11. CEILING EFFECT LINE, FPI ARRANGEMENT



With this discussion in mind, you can see that the Government/contractor sharing pattern does not have to be a straight line and that the incentive arrangement negotiated could have several shares. In considering the infinite varieties of incentive arrangements, however, keep in mind that too fancy an arrangement makes it difficult to demonstrate the tangible results of effective cost control and sound management. As a rule, the simpler the incentive arrangement, the more effective it is likely to be.

For maximum effectiveness, the arrangement should be in operation when performance starts, so that the first decisions made within the contractor's organization are made with the knowledge that every dollar spent reduces the profit potential by the amount of share. For example, if the share were 65/35, every dollar spent in performance of the contract would reduce the profit potential by 35 cents.

While this oversimplifies a complex business relationship, it truly describes the incentive arrangement. It also is significant. Both buyer and seller will have made most of the decisions that in effect fix the range of final contract costs before price negotiations start. These are the buyer's decisions about performance, design, configuration, quantities, and delivery. The seller will have made decisions as to plant, equipment, make-or-buy, vendors, tooling, and organization and manning.

Nevertheless, the seller will not know the final actual cost until some point relatively far along in performance of the contract. Hopefully, the seller will be motivated by the incentive to consider the cost implications of day-to-day operating decisions. Thus, for maximum effectiveness, you should negotiate the arrangement early in performance, preferably at the time of contract award.

Fixed-Price Incentive (Successive Targets) (FPIS)

This arrangement is not used very often. It can be useful in buying the first or second production quantity of a newly developed item. In acquiring a new system, long leadtime requirements may make it necessary to contract for a follow-on quantity before design or production stability has been achieved. Lacking this stability, and considering the remaining uncertainties, cost or pricing data available at the time of follow-on award may not be adequate for the negotiation of an FPIF arrangement.

However, you expect that the uncertainties will be resolved relatively early in performance of the follow-on contract and, as a consequence, that cost or pricing data adequate for establishing a firm target arrangement will be available. In such a case, you may use an FPIS arrangement rather than awarding a letter contract or negotiating a cost-reimbursement arrangement. The FPIS establishes an overall price ceiling and gives the contractor some degree of cost responsibility in the interval before a firm arrangement can be negotiated.

When an FPIS contract is used, a firm pricing arrangement should be negotiated before the first item on the contract is delivered. The new arrangement may be either FFP or FPIF.

The ingredients of the successive targets incentive arrangement are a price ceiling, an initial target cost, an initial target profit, an initial target price, an initial share formula, and a ceiling and floor on firm target profit (Table 1-10).

TABLE 1-10.

Initial target cost	$15,000,000
Initial target profit	1,200,000
Initial target price	16,200,000
Initial share	95/5
Ceiling on firm target profit	$ 1,350,000
Floor on firm target profit	1,050,000
Price ceiling	19,500,000

With the exception of the price ceiling, these elements of the FPIS are used to determine the firm target profit at the time of firm-up. In addition to this arrangement, the FPIS contract also specifies the time the parties will meet to negotiate an FFP or, failing that, an FPIF arrangement.

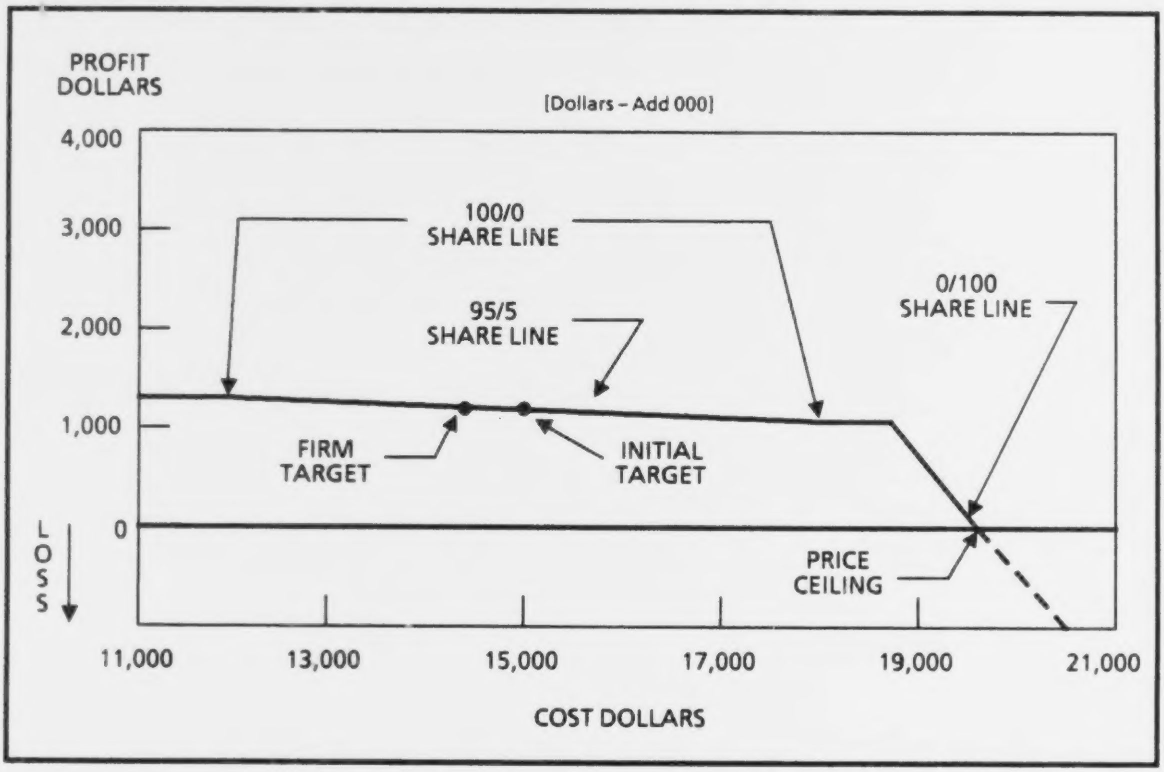
Using the figures in the example, assume negotiation of an estimated cost of $14,500,000 at firm-up. Firm target profit would then be determined as shown in Table 1-11.

TABLE 1-11.

Initial target cost	$15,000,000
Negotiated cost	14,500,000
Difference	$ 500,000 (decrease)
Contractor's share (5%)	25,000 (increase)
Initial target profit	1,200,000
Firm target profit	$ 1,225,000

Figure 1-12 depicts this example.

FIGURE 1-12. FPIS ARRANGEMENT



At this point, two alternatives exist. First, using the negotiated cost of $14,500,000 and the firm target profit as guides, you may negotiate an FFP arrangement. If you can't get agreement on a satisfactory firm price, or if you agree that the uncertainties of the remainder of the contract are too great, you may negotiate a firm target incentive.

In this event, you must negotiate a new sharing formula. Also, while the ceiling price cannot be *increased* at firm-up, you may agree to a *decrease* where firm target costs are lower than initial target costs. Assuming that a revised price ceiling of $16,700,000 and a 60/40 formula are negotiated, a firm incentive arrangement would be established as shown in Table 1-12. Final settlement at contract completion would be done in the manner described for the FPIF arrangement.

TABLE 1-12

Target cost	$14,500,000
Target profit	1,225,000
Target price	15,725,000
Price ceiling	16,700,000
Share formula	60/40

Now, again using the successive targets arrangement in the example, assume that the parties negotiate an estimated cost of $17,000,000 at time of firm-up. Firm target profit would then be determined as shown in Table 1-13. If an FFP is not in order, you might negotiate the firm incentive arrangement shown in Table 1-14.

TABLE 1-13

Initial target cost	$15,000,000
Negotiated cost	17,000,000
Difference	$ 2,000 000 (increase)
Contractor's share (5%)	$ 100,000 (decrease)
Initial target profit	1,200,000
Firm target profit	$ 1,100,000

TABLE 1-14

Target cost	$17,000,000
Target profit	1,100,000
Target price	18,100,000
Price ceiling	19,500,000
Share formula	75/25

At contract completion, final settlement would be handled in the manner described for an FPIF arrangement.

You should consider several factors in negotiating and administering a successive targets arrangement. One, the firm pricing arrangement must be negotiated early in performance, usually before shipments begin. By the time the first delivery is made, the contractor will have committed to a substantial portion of the contract cost. If a firm arrangement has not been negotiated, the contractor will not have a share in responsibility for the cost of performance and thus will not know what can be made or lost in profit. The effectiveness of any incentive contract depends upon management's reaction to the terms of the contract. One effective reaction is an operational budget based on, but lower than, the target. Planning that goes into making the budget needs to be stimulated by knowledge of the firm target costs and the actual sharing formula.

Second, an FPIS arrangement is negotiated when uncertainties do not permit negotiation of a firm arrangement and when the uncertainties of contract performance are greater than would otherwise be the case in a fixed-price arrangement. For the pricing arrangement subsequently negotiated to be realistic, the initial share should not provide as great a degree of contractor cost responsibility as would a formula negotiated under an FPIF arrangement. A 90/10 formula might be considered a reasonable initial share.

Third, ability to establish a firm pricing arrangement early is not limited by availability of cost or pricing data from the contract itself. You can draw upon data as they become available from other contracts for the same or similar equipment.

Fixed-Price with Redetermination (FPR)

There are two distinct FPR arrangements, one prospective and the other retroactive in application. The prospective type provides for the negotiation of fixed prices to be paid in a future period and can be described as a series of two or more FFP arrangements negotiated at stated times during performance. This type has been used primarily in procuring aircraft propulsion units, where the nature of manufacture and resulting methods of accounting for costs have lent themselves to periodic, plant-wide pricing on a prospective basis.

The retroactive FPR arrangement provides for adjusting contract price after performance (completely retroactive). In two respects, this arrangement is like an FPI. A ceiling price is negotiated initially, and actual, audited contract costs are used as the starting point for price revision. However, there is one significant difference. In an FPI arrangement, the degree of the contractor's cost responsibility, expressed as a share formula, is written into the contract. The retroactive FPR, however, makes the degree of cost responsibility a matter of negotiation at the time of price redetermination, after work has been completed. It requires a judgmental evaluation of how the contractor performed, an evaluation made late when it can have no effect on the quality of performance. For this reason, use of this arrangement is limited to small-dollar, short-term contracts for research and development.

Economic Price Adjustment Clauses

Economic price adjustment clauses are designed to cope with the economic uncertainties that threaten long-term fixed-price arrangements. The clauses provide for both price increases and decreases to protect the Government and the contractor from the effects of economic changes. If such clauses were not used, you could expect contractors to quote contingency allowances large enough to eliminate or reduce the risk of loss. The dangers in this solution are real. The contractor may be hurt if the changes exceed the estimate, and the Government may pay unreasonably high prices if the contingency does not materialize.

An economic price adjustment clause may be used for fixed-price arrangements resulting from both competitive and other-than-competitive procedures. Price adjustments based on established prices normally should be restricted to industry-wide contingencies; price adjustments based on labor or material costs should be limited to contingencies beyond the contractor's control.

There are three broad types of economic price adjustment provisions. Adjustments may be based on established prices, on actual labor or material cost, or on labor or material cost indexes. There are separate clauses authorized as follows for:

a. Basic steel, aluminum, brass, bronze, or copper mill products.

b. Nonstandard steel items.

c. Standard supplies.

d. Semistandard supplies.

e. Labor or material costs using the actual costs method.

f. Labor or material costs using cost indexes.

If none of the clauses authorized for adjustments based on established prices (a through d above) is applicable, a modified clause may be used, subject to approval requirements stated in regulations.

Three of the standard clauses provide for price adjustment upon notification by the contractor, and verification by the contracting officer, of increases or decreases in established prices. There is a ceiling on the amount the original contract price can be increased to reflect higher established prices, but this may be modified upon approval of the chief of the contracting office. These are the clauses for basic metals, standard supplies, and semistandard supplies.

The clause for nonstandard steel items provides for price revision to reflect changes in the cost of labor and steel. Prices are revised for each month in which supplies, by terms of the contract, are to be delivered. Adjustments are made after final delivery of supplies, and increases may not exceed a stated percentage of the original contract price.

The clause for adjustment based on actual labor or material costs puts a ceiling on the amount of upward adjustment to the original contract price, but this may be modified upon approval of the chief of the contracting office. The contractor notifies the contracting officer within a stated number of days after an increase or decrease in rates of pay or unit prices of specified materials and proposes an adjustment. The two parties must negotiate the price adjustment and its effective date.

A clause for economic price adjustment based on labor or material costs (cost index method) may be drafted and used when the period of performance extends more than one year beyond the start, the dollars subject to adjustment are substantial, and the economic variables for labor and material are unstable. Normally, there is no ceiling on the amount of adjustment that can be made under this arrangement.

When pricing a contract that provides for economic price adjustment, eliminate any contingency allowance for inflation that may be in the base costs. However, make sure you distinguish between estimates for inflation and initial prices based on the best estimate of future costs.

Cost-Plus-Incentive-Fee (CPIF)

This arrangement injects an incentive sharing formula into what would otherwise be a cost-reimbursement contract with a 100/0 share. Because the arrangement is cost-reimbursement, there are three characteristics that distinguish CPIF from FPIF and FPIS arrangements. One is the absence of a price ceiling. Second, with the CPIF, costs that meet the tests of regulatory cost principles and contract terms are reimbursed and the total of reimbursed costs is the final cost of the contract. In FPI arrangements, final cost is arrived at by negotiation after reasonableness and necessity have been established and specific items of cost have been tested for allowability and allocability. Third, under a CPIF arrangement, the maximum fee the contractor can receive is limited. A maximum fee in excess of the administrative limit must be approved as a deviation.

Under a CPIF arrangement, both maximum and minimum fee levels are negotiated at the outset. This establishes points under and over target cost where fee becomes fixed at the maximum or minimum level, contractor sharing ceases, and the contract, in effect, converts to a CPFF with a 100/0 sharing arrangement. In sharp contrast, the ceiling price in an FPI contract establishes a point over target cost where the Government ceases to share and the contract becomes an FFP with a 0/100 share formula.

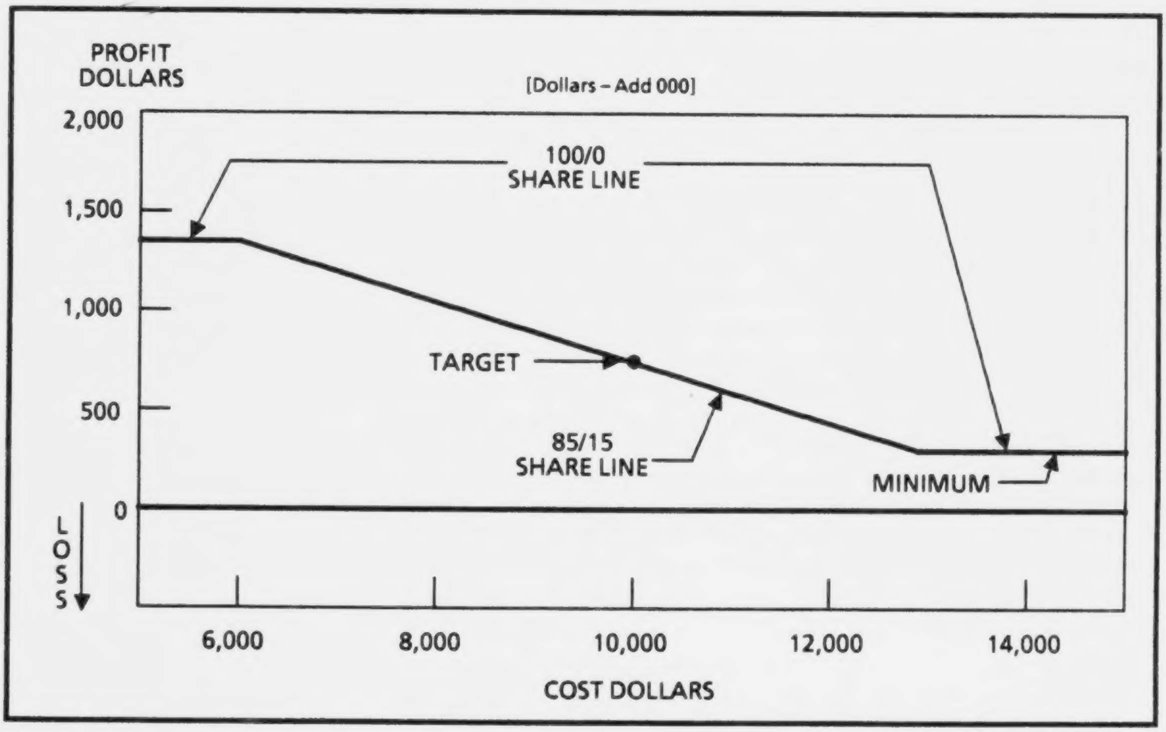
This difference is significant, for by negotiation of a CPIF arrangement the parties agree that the cost uncertainties involved in performance are too great to negotiate a realistic ceiling price within a reasonable range from target cost. Following this point to its logical conclusion, CPIF incentive arrangements should be negotiated so that the incentive remains alive over greater variations from target cost than normally would be experienced or expected for a procurement where use of an FPI contract was appropriate. As a rule, maximum and minimum fee levels and the sharing formula negotiated in a CPIF arrangement should be such that the incentive will remain in effect over the same relatively wide range of possible cost outcomes that made CPIF contracting necessary in the first place. Table 1-15 is an example of a CPIF arrangement.

TABLE 1-15

Target cost	$10,000,000
Target fee	750,000
Maximum fee	1,350,000
Minimum fee	300,000
Share formula	85/15

Figure 1-13 shows this example.

FIGURE 1-13. CPIF ARRANGEMENT



Using the example in Table 1-15, assume that the final cost is $9,000,000 (Table 1-16).

TABLE 1-16

Target cost	$10,000,000
Final cost	9,000,000
Difference	$ 1,000,000 (decrease)

The contractor receives 15 percent, or $150,000 of the $1,000,000 difference between target and final cost, as an *increase* in fee (Table 1-17). The Government receives 85 percent, or $850,000 of the $1,000,000 difference between target and final cost, as a *reduction* in price (Table 1-18).

TABLE 1-17

Target fee	$750,000
Share	150,000
Final fee	$900,000

TABLE 1-18

Final cost	$ 9,000,000
Final fee	900,000
Final cost plus fee	$ 9,900,000
Target cost plus fee	10,750,000
Reduction in price	$ 850,000

In this example, the incentive would be effective over a range of $7,000,000, an underrun of 40 percent and an overrun of 30 percent. The contractor's share of a $4,000,000 underrun would be 15 percent or $600,000; the contractor's share of a $3,000,000 overrun would be 15 percent or $450,000. Added to or subtracted from the target fee of $750,000, the share could result in a fee at the maximum level of $1,350,000 or the minimum level of $300,000. Notwithstanding the fact that the actual variation from target costs may be greater than plus $3 million or minus $4 million, the effect of the incentive arrangement under the example would be to fix the fee at no more than the maximum or at no less than the minimum level.

CPIF arrangements should be negotiated to provide the widest fee swing practicable under the circumstances. Because of the relationship between negotiated fee levels and sharing arrangement, the wider the swing between maximum and minimum fee levels, the greater the contractor's sharing percentage under the formula can be without limiting the range of cost variation over which the incentive is effective. To demonstrate this point, assume a second example of a CPIF arrangement as shown in Table 1-19.

TABLE 1-19

Target cost	$10,000,000
Target fee	700,000
Maximum fee	925,000
Minimum fee	475,000
Sharing formula	85/15

With an 85/15 share formula, the incentive would remain effective over variations from target cost of only plus or minus 15 percent or $1,500,000. (Fifteen percent of $1,500,000 equals $225,000, and $225,000 added to or subtracted from the target fee of $700,000 results in fee at either the maximum or the minimum level.) Particularly in regard to plus variations from target cost, such an incentive effectivity is unrealistic because of performance and cost uncertainties implicit in the use of CPIF. Perhaps the first question raised by this example is whether an incentive arrangement providing for a wider fee swing could not have been negotiated.

Cost-Plus-Award-Fee (CPAF)

This is a cost-reimbursement arrangement with costs reimbursed in accordance with regulatory cost principles and contract terms. It provides for a base fee and for an additional fee amount that may be awarded, in whole or in part, on the basis of periodic evaluations of ongoing contractor performance. A CPAF arrangement does not include predetermined targets and automatic fee adjustment formulas. The amount of award fee earned depends on a judgmental determination made unilaterally by the Government and not subject to conventional Disputes clause procedures.

The base fee under a CPAF arrangement is subject to administrative limits published in the acquisition regulations. It is designed to compensate the contractor for profit evaluation factors such as risk, investment, and the nature of the work to be performed, but in an amount commensurate with the minimum acceptable performance. The award fee pool represents the additional amount available to reward the contractor for performance above minimum acceptable levels in those areas described by the evaluation criteria. The total pool may be allocated equally among the various evaluation periods or, where appropriate, larger portions may be assigned to evaluation periods in which significant criteria will be most susceptible to meaningful evaluation.

Award fee adjustments are limited to increases from base fee and, depending upon actual performance as evaluated against the criteria, the contractor may earn all, part, or none of the amount available in the pool. If the award fee does motivate the contractor toward excellent or outstanding performance, then the expected result is a total fee amount greater than the fixed fee that might have been established under a CPFF arrangement. Maximum fee is the sum of base fee, the award fee pool, and any other incentive fee payable under the contract. Like base fee, maximum fee is subject to administrative limits.

A detailed performance evaluation plan is developed before work begins. The plan identifies the specific criteria to be applied under each major performance category selected for evaluation, as well as the approach for evaluating actual performance against these criteria. To reflect the management and judgmental considerations made possible through use of a CPAF arrangement, the plan should anticipate an evaluation of both performance levels and the conditions under which these levels were achieved.

Fragmentation of the award fee pool over a large number of events or criteria dilutes emphasis. Therefore, you should design the performance evaluation plan to cover the problem or improvement areas of greatest significance to you. The performance evaluation plan normally is not included in the contract. Therefore, if the key problem areas change as contract work progresses from one phase or evaluation period to the next, the Government may alter the plan unilaterally to signal changes in management emphasis. If the plan is included in the contract, the contract terms should specify that the Government has the unilateral right to amend the plan on a prospective basis. In either case, the contractor is informed when the plan is changed and is given a copy of the current plan in advance of the evaluation period or periods to which it applies.

The organizational approach you use for evaluation should reflect individual program or project requirements. This requires you to consider channels of communication that might assure early identification of any unexpected events or problems in contract performance. A performance evaluation board of relatively high-level management personnel is established to evaluate the initial assessments that front-line contract and project managers make, and it submits a recommended award fee for the designated fee-determination official to consider. This board is expected to bring to the evaluation process a broader, more objective management perspective than might otherwise be the case.

Following each evaluation, the contractor is told of the performance evaluation board's findings and tentative conclusions. This allows the Government to acknowledge meritorious contractor work and to notify the contractor of areas needing correction or improvement. The contractor is given an opportunity to respond and can furnish information on its own behalf about performance. The objective is to assure that the fee-determination official's decision is based on both the board's find[illegible] conclusions and any contractor comment regarding them.

Responsibility for the award fee determination should be at a management level high enough to assure attention and objectivity to preserve the integrity of the evaluation process. The fee-determination official reviews the performance evaluation board's recommendations, considers any contractor comments on the board's findings, and makes the determination of the award fee amount, if any, allotted for the specified evaluation period. Generally, this determination cannot be appealed to a higher management level within the department or agency unless the fee-determination official is also serving as chairman of the performance evaluation board. Further, by express contract terms, this judgmental determination is not subject to the Disputes clause of the contract, although matters involving a question of law may be appealed by the contractor in the courts.

One of the objectives in negotiating a CPAF arrangement is to achieve effective communication among Government and contractor personnel at levels where desired results can be achieved. This objective could be jeopardized if evaluation reporting is delayed to the point where it has little or no impact on the quality of ongoing performance. For this reason, formal evaluation periods normally should not extend beyond four or, at the most, six months. Also, every effort should be made to complete each step in the evaluation process in a thorough but timely manner.

Sometimes the award fee is used in combination with another pricing arrangement as a bonus for exemplary contract performance. The contract describes in general terms the performance that will merit award. The award fee amount is small in relation to the fixed fee (in what is characterized as a CPFF/AF arrangement), the target fee (CPIF/AF), or the target profit (FPIF/AF) also provided in the arrangement. Peformance is evaluated at the end of a period or the end of the contract and, as warranted, the contractor is awarded some, all, or none of the award fee dollars.

Cost-Plus-Fixed-Fee (CPFF)

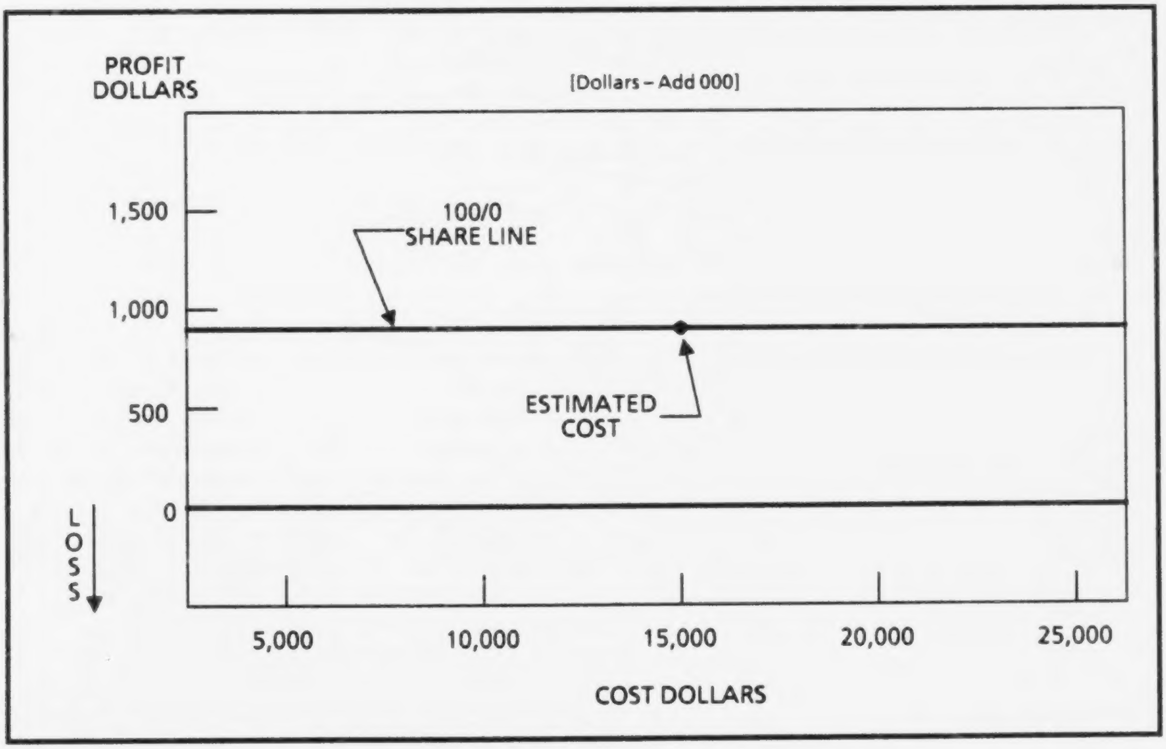
This is another cost-reimbursement arrangement; allowability of costs is governed by regulatory cost principles and the specific terms of the contract. In addition, the Government agrees to pay the contractor a fixed number of dollars above reimbursed costs as a fee for doing the work. The fee dollars may change when the scope of work required by the contract changes, or they may change if work within the scope is ordered under the Changes clause of the contract. In concept, a CPFF is the direct opposite of an FFP arrangement. If, in the language of incentive contracting, the FFP arrangement has a 0/100 share, the CPFF arrangement has a 100/0 share. Table 1-20 is an example.

TABLE 1-20

Estimated cost	$15,000,000
Fixed fee	900,000
Estimated cost plus fixed fee	$15,900,000

Figure 1-14 is a graphic presentation of the example.

FIGURE 1-14. CPFF ARRANGEMENT



Assume that final costs are $12,000,000 (Table 1-21).

TABLE 1-21

Fixed cost	$12,000,000
Fixed fee	900,000
Final cost plus fixed fee	$12,900,000

Despite performance at $3,000,000 less than originally estimated (a cost underrun), the contractor receives the same fee fixed initially by the terms of the contract. On the other hand, assume that final costs are $20,000,000 (Table 1-22).

TABLE 1-22

Final cost	$20,000,000
Fixed fee	900,000
Final cost plus fixed fee	$20,900,000

Despite performance at $5,000,000 more than originally estimated (a cost overrun), the contractor receives the same fee fixed initially by the contract terms.

The pattern illustrated by the two assumed situations is the reason for this pricing arrangement. The CPFF approach is used when the uncertainties making it necessary to write a cost-reimbursement contract are so great that use of predetermined targets and incentive sharing arrangements could result in a final fee inconsistent with the actual quality of contractor performance. A cost underrun or overrun could result less from the contractor's cost management during performance than from uncertainties at the time the contract cost estimate was agreed to.

A CPFF is a cost-reimbursement arrangement under which incurrence of costs considerably in excess of initial estimates does not adversely affect the amount of fee earned by the contractor. Given the significant uncertainty existing at the time of contract award, a CPFF cost overrun does not necessarily indicate ineffective cost control. However, cost control measures can lose effectiveness if they are neither recognized nor encouraged, and, for this reason, concern has been expressed over the use and administration of CPFF arrangements.

In a cost-reimbursement environment, and particularly in situations that do not lend themselves to the use of a predetermined, firm arrangement, effective cost control can be attained only through close management of the contract effort. Certainly, one of the advantages of the CPAF approach as an alternative to CPFF is the effect of the award fee evaluation process in fostering communications and management discipline on the part of both Government and contractor. However, a CPAF arrangement does not represent the right answer in all cases, and use of CPFF may be necessary and proper. The important point is that selection and use of a CPFF arrangement imposes a real obligation to manage contract performance effectively and in a manner consistent with Government objectives and concerns.

Like all other cost-reimbursement arrangements, a CPFF contract does not obligate the contractor to continue performance or otherwise incur expenses in excess of the established cost estimate unless and until the Government notifies it that the estimate has been increased in amount. However, under most CPFF arrangements, payment of the entire amount of fixed fee is contingent upon contractor completion of a clearly defined task or job as specified in the contract. (In certain cases, this completion requirement may be satisifed by a final report of research.)

Alternatively, the contract may describe work requirements in general terms and limit the contractor's performance obligation under the CPFF arrangement to the expenditure of a specified level of effort within a definite period of time. This alternative approach is identified as the "term form" of CPFF, a special arrangement with relatively narrow applications in certain research and exploratory development procurements.

Cost Contract (CR)

The Government agrees to reimburse the contractor for all allowable and allocable costs incurred in performing the contract, but no fee is paid. Cost allowability is determined in accordance with regulatory cost principles and specific provisions of the contract. Because of the no-fee feature, this arrangement has limited appeal. Generally, its use is restricted either to research contracts with educational institutions or to contracts providing facilities to contractors.

Facilities generally means industrial property for production, maintenance, research, development, or test. The term includes real property and rights therein, buildings, structures, improvements, and plant equipment, but it does not include material, special tooling, military property, or special test equipment. When used in a facilities contract, the term includes all property provided under that contract.

The policy is that contractors will furnish all facilities needed for performance of Government contracts. (The Government may provide facilities for economy or to get contract performance.) To support the policy of private ownership of facilities, no fee is provided or allowed a facilities contractor under a facilities contract. The opportunity to earn profit is provided by whatever other contracts for supplies or services the contractor is awarded.

When research efforts are bought from educational institutions, use of a CR arrangement is justified by the nonprofit character of the schools and the intrinsic attractiveness of particular projects. If a project is in an area of study that interests an institution's scientists, reimbursement of the research cost can be compensation enough.

Cost-Sharing (CS)

Under this arrangement, the Government agrees to reimburse the contractor for a predetermined portion of the allowable costs of contract performance. The contractor agrees to absorb a part of the cost of performance in the expectation of compensating benefits to the firm or organization. Such benefits might include an enhancement of the contractor's capability and expertise or an improvement of its competitive position in the commercial marketplace.

Most cost-sharing arrangements are designed for the procurement of basic and applied research. The amount of cost participation by the contractor will vary in accordance with a number of factors -- character of the research effort, profit or nonprofit status of the organization, potential application of results to other research activities, downstream commercial applicability, and so forth.

Cost participation by educational institutions and other nonprofit contractors normally should be within a range from 1 percent to 5 percent of the total contract cost. Cost participation by commercial contractors could range reasonably from as little as 1 percent to more than 50 percent of total contract cost. Whatever cost-sharing arrangement is negotiated, the point is that participation by contractors and nonprofit organizations is intended to serve the mutual interests of the Government and contract performers to assure the efficient use of resources for the conduct of research projects.

You should not tie source selection and award of contract to a company's willingness to share costs, nor should you ask for proposals on a work statement that you know cannot be completed within available funds. Lastly, you should not even hint that acceptance of a CS arrangement will place a contractor in a preferred position in competition for a possible future contract.

Time-and-Materials (T-M)

This arrangement is used to buy time at a fixed and specified hourly rate that includes direct labor, indirect costs, and profit, and materials at cost.

The T-M contract is designed for situations where the amount or duration of work cannot be predicted and, as a result, where the costs cannot be estimated realistically. These are the conditions under which you sometimes buy repair and overhaul services, situations where you cannot predict with confidence the condition of items to be repaired and, thus, the amount and kind of work that will be needed.

Although it may be necessary to use T-M, its use is not favored. Under it the contractor can increase indirect cost absorption and profits by expending additional hours of direct labor. T-M also may be abused if the contractor uses lower-graded labor than was priced in the hourly rate. This may benefit the contractor in two ways. One, it gives a favorable differential in rates. Two, less-skilled laborers may take more hours to do the job. These potential hazards make it necessary to administer T-M arrangements very closely to ensure that the contractor exercises proper control and restraint.

The contractor is to acquire any material needed to perform the contract work. The costs of acquisition, plus certain other costs, will be reimbursed. Allowable costs of indirect materials also are determined in accordance with regulatory cost principles. Reasonable and allocable material handling costs may be included in the charge for material at cost if they are clearly excluded from the fixed hourly labor rate. Subcontract costs limited to the amounts actually paid to the subcontractor will be reimbursed, but no costs arising from the letting, administration, or supervision of subcontract performance will be included beyond those in overhead covered by the hourly rate.

The reasoning behind limiting payment to material at cost, without provision for profit or fee, is this. First, profit for the contract is provided in the hourly rate. Second, because it is not possible to estimate in advance the kinds, quantities, and value of materials that may be required, there is no way to provide for inclusion of a reasonable profit in the material charge without violating the prohibition against cost-plus-a-percentage-of-cost contracting. Third, when T-M is used to buy maintenance and overhaul, we usually want the contractor to repair rather than replace, to the extent that this is economical, and the absence of a provision for profit makes replacement a less attractive alternative.

Labor-Hour (L-H)

This arrangement is the same as a T-M, except that the contractor does not supply materials.

Price ceilings

FPI and FPR arrangements specify ceiling amounts that are the upper limits to any adjustment in price brought about by the working of those pricing arrangements. The best way to set a ceiling is to look at one as the sum of the maximum amount of dollars of cost you would be willing to pay and the profit you would consider reasonable at that cost level (see Table 1-23).

In this situation, your negotiation objective for a target would probably be the amount it is "likely" to cost, plus profit consistent with that result. Your ceiling objective would be the lowest figure above target you can negotiate, consistent with uncertainties of contract peformance, and no higher than $137,000.

TABLE 1-23

	COMPANY PROPOSAL	GOVERNMENT ANALYSIS	
		LIKELY	POSSIBLE
Total cost	$135,000	$115,000	$130,000
Profit	20,250	12,500	7,000
Price	$155,250	$127,500	$137,000

Pricing arrangements as control mechanisms

We have said that the objective of contract pricing is payment of a price fair to both parties to the transaction, considering the quality and timeliness of contract performance. While payment of a price commensurate with actual performance is the objective, the contract pricing function also is interested in influencing that performance through negotiation of arrangements that motivate the contractor to perform in a manner consistent with the Government's concerns and priorities. However, there are limits to what can be expected or achieved in this regard, and it is unrealistic to assume that a pricing arrangement can assure the type of performance desired by the Government.

Any pricing arrangement must be viewed in terms of the physical and contractual environment in which the work will be done. As a result, there is no magic, no special virtue in any given pricing arrangement. No matter how realistically negotiated, a firm-fixed-price arrangement worth $50,000 and calling for 10 months of effort may not receive as much immediate or continuing attention in a company with monthly billings averaging $2 million as it would in a smaller company. Any benefits accruing to that one contract would instead reflect the quality of management and the normal effectiveness of the company's operations. Where the company typically has a great number of relatively small-dollar contracts open at any one time, any incentive to control and reduce costs will come from management's total responsiveness to profitability and loss rather than from the pricing arrangements of the several contracts. The company, in such a circumstance, while mindful of its performance responsibilities, is not likely to manage strictly on a contract-by-contract basis.

Even in the case of large-dollar contracts, it is an oversimplification to assume that the forces motivating the contractor can be defined exclusively in terms of the profit potential afforded by a particular pricing arrangement. Forces outside the contract may exert an equal or even more profound influence on management decisions. These extracontractual considerations include, but are not limited to, the following kinds of rewards and motivations:

a. Corporate growth and development.

b. Maintenance or attainment of a high sales level.

c. Opportunities for follow-on business.

d. Maintenance and development of personnel and technical capabilities.

e. Organizational prestige.

f. Commercial spin-off opportunities.

g. Protection of company reputation with the Government (market maintenance).

h. Advancements in the level of technical knowledge.

i. Coverage of fixed overhead costs.

j. Enhancement of public image.

Some extracontractual motivations may coincide with those provided by a particular pricing arrangement. Others may represent a potential conflict because they do not coincide or do so only in part. Further, the extent to which individual managers or decision-makers are motivated by various considerations, either contractual or extracontractual, is apt to be influenced by factors such as their positions and responsibilities in the organization and their personal and professional backgrounds, interests, and experiences.

All of which brings us to an important albeit obvious point: people manage contracts. No contract document or pricing arrangement can substitute for effective program/project management by both Government and contractor. What a pricing arrangement can do is provide an environment that encourages effective management consistent with Government objectives. Management considerations of this kind are especially important in situations where unexpected events or problems could have a significant impact on procurement priorities and concerns.

1.8 Why Analyze Prices?

Why analyze prices? Why not simply accept the offer or shop around as you might when buying consumer items for your own use? One answer is that you well might do either or both of these things. Even though you bear a special responsibility because you are spending public funds, you don't have to act differently from the way you would if you, an informed buyer, were spending your own money for products available in the marketplace. "Analysis" is the word that describes what you do to become an informed buyer. You read the car ads, you check the blue book and the red book, you study price lists, you double-check your budget, your bank balance, and your obligations, you decide you really do need a new car, and you go looking. All this is analysis. When you get to the point where you are ready to talk a deal, you will have made judgments as to relative value of different cars and will have rejected certain styles, models, options, and dealers.

In Government procurement the trappings are different and more people are involved, but if the product is available in the marketplace, the process is not very different and price analysis is not easily distinguishable from the rest of the buying process.

If the product is not available in the marketplace, however, you have to describe it and find someone to make it and sell it to you. You still have to analyze the price offered to decide whether you should pay that much, but the analysis is different. Although you must ultimately reach a decision as to value, you base your judgment in large part on your estimate of what it will cost to do the work and on a comparison with the cost of alternatives.

In a price-competitive market, a seller's price may be related more closely to what competitors are likely to quote than to the cost of manufacture or acquisition. All else being equal, performance must be effective and economical if the company is to make a profit. A company operating in a price-competitive industry may sometimes find it desirable or necessary to absorb losses. However, a company cannot long survive unless these losses are balanced by substantial profits on products or services where it has a competitive advantage. Such an advantage is realized only when the company is able to make an adequate profit at a price as low as or lower than its most efficient competitors are likely to quote.

Competition is absent in certain procurement situations. In others, its effectiveness in assuring a reasonable pricing result may be limited by the extent and nature of performance uncertainty involved and the emphasis placed upon technical, nonpricing factors in the selection process. In the absence of effective price competition or another basis for determining price reasonableness, cost analysis is generally required. Cost analysis provides a means for reviewing the estimating methods and assumptions used by the contractor and for evaluating whether these anticipate the normal efficiencies you would expect to find in a price-competitive environment.

While proposed prices submitted in the absence of effective price competition are frequently lowered by analysis and negotiation, price reduction is not your principal objective. This must be stressed. Where warranted, reduction is a proper result, but the attitude that every quotation analyzed must be reduced is wrong.

It can be self-defeating for at least two reasons. First, that attitude is obvious, and companies often anticipate it when preparing proposals. Second, an obvious determination to negotiate to a level lower than that proposed may be a pricing objective based upon unwarranted, untenable assumptions. It is both frustrating and ineffective to negotiate from such a position, and this bias can destroy the attitudes of mutual respect (between contractor and Government and among the various Government specialists involved) so necessary to successful negotiations.

If reduction of a company's proposal is not the objective in analysis, what's it all about? Stated one way, you analyze price proposals to see whether you want to pay the prices offered. Stated another way, you analyze offers to see whether the prices represent value.

Value depends on a combination of factors that individually will have greater or lesser importance in relation to each other in every procurement. In the case of a product, some of the factors are how well it satisfies the need; the likelihood the delivered product will perform as promised; useful life; frequency, ease, and cost of repair; delivery; offered price; and special terms and conditions of sale. If you are buying a service, value factors include timeliness, the cost and feasibility of performing the service within existing resources, and the likely quality of the service that will be rendered. For both, the existence of real alternatives obviously bears on value.

Cost analysis contributes to the value judgment by providing a basis for understanding how the company proposes to do the work and what estimating assumptions it made in preparing its proposal. Ultimately, these understandings form the basis from which price negotiations are conducted.

1.9 Prospective and Retroactive Pricing

Prospective pricing requires a pricing decision in advance of performance, a decision based on analysis of comparative prices, cost estimates, past costs, or combinations of such factors. A fundamental principle of prospective pricing is to agree upon all other terms and conditions of the contract at the same time you reach agreement on price. This is because these other terms and conditions affect the responsibilities assumed by the respective parties and have a definite impact on what it will or should cost the contractor to perform. We are talking about specification requirements and about contract provisions dealing with delivery schedules, inspection and acceptance, Government property, changes, precontract costs, and the correction of deficiencies, to name a few.

Retroactive pricing takes place when negotiations are conducted after some or all of the work has been done and when some or all of the costs have been incurred. These negotiations are based on a review of both the contractor's performance and the recorded cost data.

Prospective pricing is the more common type. It is also the more desirable one, especially where a firm pricing arrangement can be established. The limiting factor in any decision to establish a firm contract price for a future event is, of course, the degree and nature of uncertainty involved.

Stated another way, in accepting a firm price for work to be done later, the contractor takes the chance of losing at least the expected profit from the sale and in so doing accepts full responsibility for the cost of the work. If the prospectively negotiated price bears a reasonable relationship to the probable cost and the contractor is interested in making a profit on the particular sale, this is thought to provide a built-in reason to control costs. If the cost of a purchased component goes up unexpectedly, if rework goes up, or if assembly and test suddenly take twice as long as before, profit is threatened and the contractor may have time to compensate in other cost areas to maximize profit or minimize loss. The Government's constant concern, however, is that such events and any compensating action taken in response to them should not reduce quality.

Whether the situation involves prospective or retroactive pricing, your objective is the same: to negotiate realistically on the basis of what it should cost or should have cost to perform. Where a prospective quotation is not based on price competition, analysis will generally require evaluating any prior cost and production experience and developing estimates of what realistic costs and profits should be during the period of contract performance. In the retroactive situation, costs have already been incurred, and it may be more difficult to inject the idea of what it should have cost into the negotiation. Here analysis must provide the basis for effective negotiation by establishing the reasonableness and necessity of all costs incurred and the relative effectiveness of the contractor's management and performance.

Suggested Readings

Objectives and Responsibilities

FAR	1.601 General
FAR	1.602 Contracting officers
DFARS	1.602 Authority of Contracting Officers

Pricing in the Procurement Process

FAR	7.104 General procedures
FAR	5.802 Policy
DFARS	15.803 General

Procurement Procedures and Pricing

FAR Part	6	Competiton Requirements
	6.1	Full and Open Competition
	6.3	Other than Full and Open Competition
DFARS	6.3	Other than Full and Open Competition
FAR	6.4	Sealed Bidding and Competitive Proposals

Pricing Dogma

FAR	15.805 Proposal analysis
DFARS	15.805 Proposal Analysis

Price and Pricing Arrangements

FAR	Part 16 Types of Contracts
DFARS	Part 16 Types of Contracts

CHAPTER 2
Prices and Price Analysis

CHAPTER 2

PRICES AND PRICE ANALYSIS

CONTENTS

2.1 Price Theory 2- 1
  Degrees of competition 2- 2

2.2 Different Views of Price 2- 3

2.3 Standards for Judging Price 2- 4

2.4 Competition 2- 4

2.5 Fair and Reasonable Price 2- 6

2.6 Price Analysis 2- 7

2.7 Testing for Competition 2- 9

2.8 Established Catalog or Market Prices 2-11

2.9 Techniques 2-12
  Price comparison 2-12
  Government catalogs 2-14
  Government estimates 2-14
  Value analysis 2-15
  Visual analysis 2-15

2.10 Specific Guidance 2-16

The objective of procurement is to secure needed supplies and services from responsible sources at fair and reasonable prices calculated to result in the lowest ultimate overall cost to the Government. All procurements will be made competitively, if practicable, by sealed bidding or competitive proposals. Noncompetitive procedures may be used in specifically prescribed situations, if approved. In all possible situations, competitive bids or proposals will be solicited from as many qualified sources as needed to assure full and open competition and to achieve the most advantageous contract.

These policies emphasize that competition is the direct way to a good contract and that a fair and reasonable price is the objective in all procurements, competitive or not. Both concepts are derived from the theory of price, which will be discussed briefly.

2.1 Price Theory

Adam Smith promulgated a theory that an individual, in pursuing his own selfish good, would be led to achieve the best good for all. Smith reasoned that prices and price levels are regulators that tend to bring supply and demand into equilibrium and to cause, in the long run, the most efficient allocation of scarce resources. He postulated that (1) demand in excess of available supplies will lead to higher prices in the short run, and (2) if strong demand continues or appears likely to continue for an appreciable time,the higher prices will attract new suppliers. Conversely, supply in excess of demand will lead to lower prices in the short run as sellers attempt to move their products, and, if demand and prices remain or appear likely to remain weak, some sellers will quit the market.

Additional resources, called the factors of production, must be committed to increase the supply in any one product market. Land, labor, and capital -- the factors of production -- are always limited in any economy. Thus, additional resources come to one market from other markets. They come from markets where they are used less efficiently, as measured by the lower prices, profits, and returns on investment they command. It is this feature that supports the role of price as the regulator controlling the allocation of scarce resources for their most efficient use.

Economists have come to recognize that the law of supply and demand works perfectly only under conditions of perfect competition. They have defined "perfect competition" as many sellers and buyers of a homogeneous and perfectly interchangeable product, all free to enter or leave the particular market at will. Under perfect competition, the price is determined solely by supply and demand, and neither the seller nor the buyer can control the price level.

Degrees of competition

Modern price theory classifies markets by degrees of competition -- a relative concept -- and develops theories about the relationship of demand, supply, and price levels under varying competitive conditions. (A single company may sell different products in different markets with different degrees of competition.) The principal classifications, in approximate order of decreasing competition, are:

Perfect competition
Effective competition
Imperfect competition
    Monopolistic
    Oligopolistic
    Oligopsonistic
Monopoly
Monopsony

Perfect competition exists when there are many sellers and buyers, the product is homogeneous and perfectly interchangeable, and the market price is determined by supply and demand. The seller may decide to sell or refuse to sell at the existing price; the seller does not control the price. Some farm products may be traded under conditions of perfect competition.

Effective competition is the same as perfect competition, except that the number of sellers is limited. However, there must be enough sellers so that no one seller dominates the market. All sellers are independent and active rivals, and new firms can enter the market easily.

Monopolistic competition is the same as perfect competition, except that there is product differentiation; that is, the sellers are able to establish real or illusory differences among the products they offer for sale. The seller is able to control price to some degree if buyers can be convinced that the seller's product is different from those of other sellers. Much retail trade falls into this category.

Oligopolistic competition exists when there are few sellers and many buyers of products that have degrees of difference. The seller, through advertising and quality differentiation, is able to control price to some extent. This kind of competition exists with steel and aluminum, for example, where there may be little real difference in product, and with automobiles, major appliances, and machinery, where there usually is product differentiation.

Oligopsonistic competition is like oligopolistic competition, except that there are many sellers and only a few buyers.

Monopoly exists when there is one seller and many buyers of a product that has no close substitutes. The seller has considerable control over price, so much so that the prices of some sellers, like utilities, are regulated. Monopoly also exists when, as with sole-source military items, there is one seller and one buyer. The seller's control over price varies according to circumstances that determine bargaining strength.

Monopsony exists when there are several sellers and one buyer of interchangeable products. The sellers tend to have little effective control over price.

The conclusions are obvious. Under the perfect and effective classes of competition, the seller has no control over price. The closer the seller is to being the only one offering the particular product, the more control that seller has, as long as there are many buyers.

2.2 Different Views of Price

There are at least three views of what constitutes a reasonable price. One is that the market price is the reasonable price. A second is the seller's idea that a reasonable price is the full cost to produce plus a reasonable profit. A third is the buyer's idea that a reasonable price is the lowest price that must be paid to get the needed product.

Support for the market price rests on the idea that competitive forces determine what quantities will be bought and sold at what prices under specific market conditions at a moment in time. This view evolves from the concept of perfect competition and the understanding that there is competition among potential buyers for the available supply and competition among potential sellers for the available demand.

The seller's concept that price must cover full cost plus profit may be modified significantly if the product must be sold in the marketplace. There, the factors that determine the existence of a market and make the law of supply and demand work interact dynamically to influence price. The factors are the number of buyers, the number of sellers, the costs to produce, the amounts of profit, the intensity of demand, and the availability of alternatives. However, because the law of supply and demand works perfectly only when competition is perfect, imperfect competition, especially monopoly, causes imbalances between supply and demand and distorts market prices.

The buyer may strive for the lowest price, but how much that will be may be influenced by the intensity of the need, the utility of the product, and the alternatives that are open. Utility is hard to measure. If a buyer needs a particular product to perform a vital mission, that one product will have a very high utility. On the other hand, if substitutes are available or if the mission is not really vital, the product may have low utility.

If the buyer is not buying for his own use, need and utility tend to be abstract concepts and are of little help in establishing the reasonableness of price. The Government buyer's need is to satisfy the funded purchase request that starts the procurement process. The need for, and utility of, a particular product are decided by someone else. As a result, the buyer may see that the job is merely to buy at the best (the lowest) price a seller will agree to. If that price is higher than the money provided on the purchase request, the buyer must go back to the person who originated the request. Need and utility may be reevaluated and appropriate changes may be made in the requisition. (Even where the money provided covers the price agreed to, the buyer will usually revalidate the requirement before awarding a contract.) While these steps are sound and necessary, they are of little comfort to the buyer who must decide whether the price is reasonable.

2.3 Standards for Judging Price

The Government buyer has several standards to use in judging whether to pay the seller's asking price.

Prospectively, that is, before contract award, the buyer may use one or more of the following to test the reasonableness of a seller's price:

a. The prices of competing bids or offers for the instant procurement. This requires a determination that there is or is not full and open price competition.

b. Evidence of sales of the same or a similar item to other customers under comparable terms and conditions. This involves a determination as to how close the prices must be to be comparable and raises questions as to how similar items must be to be considered comparable.

c. Prices paid by the Government in the past for the same or a similar item under similar terms and conditions.

d. Probable cost plus profit. The costs may be projections of actual costs of prior work, estimates of future work, or, as with letter contracts, a combination of actual costs to date and estimated costs to complete.

e. Need to deal with one source. This may be more of a condition than it is a standard. Best price obtainable from the only source that can supply the product may be the standard if the need is valid and no alternatives exist.

Retroactively, that is, after the contract work has been completed, the buyer must rely on actual costs of contract performance to establish the fixed price to be paid for the work if the contract calls for such action. Actual costs are examined and tested for allocability, allowability, and reasonableness. Costs judged to have met those tests and profit determined in accordance with contract terms become the price paid, and that price is held to be reasonable.

In summary, price is judged by various standards depending on

a. Funds available,

b. The need (how many, and how soon), and

c. The product, and the product determines whether there is or will be a competitive marketplace to influence the price offered.

2.4 Competition

We have already said that competition is a prominent factor in procurement law and policies. There are at least three reasons for this prominence.

One is the principle that all qualified companies should have the opportunity to do business with the Government and have the right to strive on an equal basis with all other potential suppliers. Stated another way, contracts should go to the company offering the most advantageous contract to the Government. Full and open competition is intended to achieve this objective.

The second reason for using competition is to find out what is available to meet a particular need. The Government may have a specialized requirement that no known product can satisfy. Competitive solicitation may turn up such a product, or it may lead to development of a new product designed to meet the need.

The third reason is very close to the first. Competition is the best way to make sure that the resulting contract price is not rigged in favor of either buyer or seller, that it in fact results from the impartial working of the marketplace. The Government should not pay unfair prices, and the contractor should not realize exorbitant profits. In other words, competition is undertaken to ensure that the Government pays, and the contractor receives, prices representing reasonable payment for the work performed.

The idea that competition results in fair prices must be viewed as a truism and not a fact. The fact that many companies are asked to propose does not mean that each has an equal chance of winning the competition. The fact that several do propose does not mean that the price of the low offeror is fair. The virtues we ascribe to competition are those that exist under conditions of perfect competition, when supply and demand are in a state of equilibrium. They hardly ever are, particularly in the markets for military goods and services.

Implicit in the doctrine of competition is the understanding that seller and buyer each will attempt to exploit the current situation to its own advantage. The seller will offer a price that will satisfy its objectives, and the buyer will pay a price no higher than necessary to get the product or service that will satisfy its needs (its objective). Which one prevails will depend on relative bargaining strength, and this will depend on the interaction of such factors as the number of buyers and sellers of the product, the costs, the amounts of profit, the intensity of demand, and the alternatives available to both buyers and sellers.

If we were to act out the role ascribed to the buyer in the law of supply and demand, we would not be concerned with the fairness of the price to the seller; that's the seller's problem. However, you don't usually work that way. You are constrained by the concept of the fair and reasonable price and the fact that the competition you are able to foster is imperfect. Recognizing this, you must analyze the procurement situation and the offers to determine that there is competition for your requirement and that the competition is effective.

You can't decide that there is effective price competition until you are satisfied that four conditions have been met: (1) at least two offerors (2) that can satisfy the Government's requirement (3) independently contend for a contract to be awarded to the offeror that submits the lowest evaluated price (4) by submitting priced offers responsive to the stated requirements of the solicitation.

These conditions assume that the Government's requirement is clearly stated with plans, drawings, and specifications so that potential suppliers can know exactly what is wanted and make intelligent bids or offers. The product or service required will dictate in some measure how well the Government can do this. If it can be done so that potential suppliers can respond with fixed prices, the procurement may be made by sealed bidding. The question of price is then settled pragmatically; award is made to the responsible bidder whose bid, conforming to the solicitation, will be most advantageous to the Government, price and other price-related factors considered. Competition is presumed to be effective.

If a requirement can be described by performance but not by detailed specifications, if the product has not been made before, if the quantity is small, or if the period of performance is so long as to create unusual risks, sealed bidding may not be appropriate. Many potential suppliers may be solicited, but the basic conditions that make sealed bidding inappropriate make effective price competition more difficult to attain. While companies may still strive to win the competition, price may not be the deciding factor in determining the winner, and the resulting pricing arrangement may need to be something other than firm-fixed-price (FFP).

Thus, effective price competition is an objective, a condition to be encouraged and sought after, but one that is not always attainable. Completely free and open competition, with unlimited numbers of suppliers asked to submit bids or offers, may not be realistic either, because it may be uneconomical. The number of potential suppliers may be too great, the requirement may demand special skills or special facilities costly or difficult to acquire, or the cost to prepare a response may be too great in terms of money and resources.

If there is no market, that is, if no existing product will meet the Government's requirement, the Government must take steps to create a market. For example, in the 1950's there were a number of missile manufacturers, some of which had built guided missiles, but none that had built a ballistic missile. When the Government decided that national security and specific threats made a ballistic missile necessary, it had to contract to have one built.

It asked the airframe industry to propose designs that would meet broad specifications. The proposals could have been construed as competitive in that several companies did respond and not all were selected to develop the new product. Although competitive, it was not price competition. The ultimate winner was selected on the basis of design and performance characteristics, not price, because the uncertainties were too great to justify a fixed-price arrangement.

2.5 Fair and Reasonable Price

You are to procure supplies and services at fair and reasonable prices, but what is fair and reasonable? In Appendix B, a fair and reasonable price is described as one that is fair to both parties, considering the promised quality and timeliness of contract performance. Thus, to be fair to both parties, the price must represent a reasonable compromise between the seller's and the buyer's view of a fair price.

In any given procurement situation, there rarely is a single price that is fair and reasonable from all viewpoints. More likely, there may be a range of prices that are fair under the circumstances, considering the degree of competition and the character of the market in which the item or service, and other, similar ones, are usually bought and sold. "Reasonable," however, is subjective and implies a personal viewpoint; there is a price that is reasonable. As a result, you should consider "fair and reasonable" in three dimensions: fair under current market conditions; reasonable to the seller; and reasonable to the buyer.

Price theory tells us that the kind and degree of competition determine which dimension will be dominant in any given situation. The fair market price is determined by supply and demand if there is perfect or effective competition. Whether that price is also reasonable to either buyer or seller is a material question only if it causes one to enter or leave that particular market.

Under conditions of imperfect competition, the fair market price becomes a progressively less material question as conditions move toward monopoly. The emphasis shifts toward what price is reasonable to the buyer and what price is reasonable to the seller. The buyer's idea of reasonable price is determined by value, utility, and the existence of alternatives. The seller's idea often is based on full costs plus a reasonable return.

While this seems to beg the question, remember that in any given procurement situation no one price is fair and reasonable from all viewpoints. It is more important to understand the economic forces working on the price at which the product will change hands than to arrive at a complete definition of a fair and reasonable price.

Fair and reasonable describes a conclusion that the price is acceptable to both the Government and the seller. In sealed bid procurements, it usually is presumed that the lowest bid price is fair and reasonable. The same presumption usually exists in procurements placed after other competitive procedures, if price competition is effective.

In either case, if price competition is not effective, the lowest offer is not necessarily fair and reasonable. Other factors that must be considered are quality in relation to use, ability to deliver on time, and ultimate cost to the taxpayer. (Ultimate cost may be measured by ease and cost of maintenance, transportation costs, and service life, including time between overhauls, in addition to the cost of acquisition.) Demonstration that a given price is fair and reasonable will depend on how the buyer reached the decision to buy at that price, the price comparisons made, the Government engineering estimates used and detailed estimates of the costs to perform, and how the buyer prepared for and conducted negotiations.

2.6 Price Analysis

The conclusion that a price is fair and reasonable must be based on some form of analysis, either price analysis or a combination of price and cost analysis.

Price analysis is the process of examining and evaluating a price without looking at the estimated cost elements and proposed profit of the offeror whose price is being evaluated.

Price analysis includes:

a. Comparison of competitive price quotations.

b. Comparison of prior quotations and contract prices with current quotations for the same or similar end items.

c. Use of yardsticks or parametric relationships to point up apparent gross differences. Examples are: dollars per pound or per horsepower, square foot cost of a building, daily cost of a hospital room, cost of washing a single window, or any other unit that can be compared with some familiar unit that has been bought before.

d. Comparison of prices on published price lists issued on a competitive basis with published market prices of commodities, together with discount or rebate schedules.

e. Comparison of proposed prices with independent estimates of cost developed within the purchasing office.

In sealed bidding, price analysis is used to determine whether the price is reasonable. This analysis may include a look at what the companies have done on earlier contracts, a comparison with prices paid before for the same or similar product or service, or a comparison with an independent Government estimate. However, because of the rules of sealed bidding, this analysis tends to be, and should be, rather routine.

When other competitive procurement procedures are used, the analysis that leads to the conclusion that effective price competition does or does not exist is price analysis. The depth of this analysis will depend on the products or services being purchased and the dollars involved.

If you can't decide, by comparing offers, that the competition is adequate, you will need to make a more detailed analysis using past prices, quantities, production and delivery rates, and similar noncost information. You usually will have to negotiate with the offerors in order to be sure about the price. Similarly, price analysis is what you use to determine the truth of a representation that certain items are commercial items with established catalog or market prices, and that, as a consequence, the asking price is reasonable.

In the right circumstances you can make a sound price decision after price analysis without using cost analysis techniques at all, but you cannot make one on the basis of cost analysis alone. In other words, price analysis is to be performed on every procurement.

As a rule, price analysis can do the job on relatively small-dollar procurements. When we say this, though, we use small-dollar to mean relatively easy, simple, uncomplicated procurements. You know this isn't always so. Many small-dollar (under $100,000) procurements are hard to handle, and price analysis is not necessarily the answer on small-quantity, noncompetitive procurements of new items or items long out of production.

Even though the obligation to contract at fair and reasonable prices does not diminish as you move down the scale from multimillion dollar contracts to nickel-and-dime line-item prices, you are obligated to budget your time to balance the cost of analysis with the probable return from your effort. For those who think in terms of million-dollar and even half-a-million-dollar buys, there is a real danger in passing too lightly over the importance a $50,000 order can have to a company or the significance of the first-time buy of a new piece of equipment that has tremendous sales potential.

If the procurement exceeds $100,000 and otherwise meets the tests, you will get cost or pricing data, perform price analysis and cost analysis, negotiate, and get a certificate of current data, even though you might be able to establish the reasonableness of the offer by price analysis alone.

Many factors will cause you to choose specific methods in making the price decision, and these factors are not constant from one procurement to the next. In the lowest dollar ranges, the possible return is so small in relation to the effort required that any intensive analysis is ruled out. In the next ranges, price analysis will be adequate for many procurements, but for others, cost analysis can pay off in large dollar returns, even if it takes more than one procurement to contribute a significant dollar payoff. Over $100,000, cost or pricing data will be required from the would-be seller and cost analysis will be performed except in specific circumstances, which are discussed in Chapter 3. Analysis is necessary on large-dollar procurements and is worthwhile even when the resulting contract price is the same as that initially proposed by the contractor, if only for the assurance that analysis gives that the contract price is fair and reasonable.

As a technique, price analysis is generally favored over cost analysis. However, it is rather like a daydream that starts "Life would be good if only...." Price analysis is an objective, something to strive for. By itself, it may not get better results than cost analysis; there are some basic obstacles to using it effectively that we will discuss in a minute. Price analysis is preferred because of the company it keeps. It is most effective when there is procurement history and where competition, or the high probability of it, exists.

Price analysis must be used when you perform cost analysis. With cost analysis, there always is the danger that you will lose sight of price. A price is reasonable not so much because it is [illegible] a little higher than what it will cost the seller, but because it is worth it to you, the buyer. Stated more formally, Government procurement is concerned primarily with the reasonableness of the ultimate price and only secondarily with eventual cost and profit to the contractor. These are brave words, given the stress on profit and on accurate, current, and complete cost or pricing data, certification of current cost or pricing data, defective cost or pricing data clauses, and defective-pricing audits. We will try to put this apparent conflict of interests into perspective.

Price is our primary concern, and "price" means "worth" or "value." Carrying the idea along, consider the company that offers to sell you an engine for a unit price of $358,000. You analyze the proposal, relating the estimated costs to the company's present and projected improvements in material and labor use. You look at trends in experienced costs, develop a profit objective, and put it all together in a price. You compare the proposed price with past prices paid the company for the same and similar engines. You note an upward trend. You see that the company could produce for less if it put in new equipment and new processes and developed a new source for turbine blades.

Your objective, based on these considerations, would be a price of $330,000, but you find that it is too late in the program to think of new subcontract sources and it would not be economical to invest in new plant and machinery. Ultimately, you accept the situation and conclude that $340,000 is a realistic estimate of costs under the conditions that will prevail during contract performance. You are willing to pay something more than $340,000 but less than $358,000 each for the engines. You reach agreement at $355,000 and are satisfied that the engine is worth that price.

You have reached the conclusion that the price is reasonable in a sole-source negotiation after using both cost and price analysis; it is a sound conclusion. Would it be as sound, however, if a second company were to offer to sell you the same engine at $310,000?

You analyze that price in relation to other prices, current competitive as well as past ones, and evaluate the estimated costs. You are satisfied that the second company can do the job, on time and at the required level of quality. No matter how realistic $340,000 was as an estimate of what it would cost the first company and no matter how much that figure represented the results of effective and prudent management, you would not now say that the engine was worth $355,000 to you -- unless. The "unless" would be an economic or strategic consideration, such as a management decision that the first company has to be kept in business because of its design capability, or that its production capacity will be needed for a new program building up to all-out production late next year.

We have taken the long way around to show that price analysis is used to keep attention focused on value. Price analysis techniques are generally less costly and time-consuming than cost analysis techniques, but this virtue is attributable to the procurement situation to which price analysis is best suited. Competitive procurements, commercial items, and standard parts with usable price histories inhabit this particular world.

The expenses of cost analysis, in terms of dollars and days needed to collect and evaluate the data that must support it, are incurred by both the company and the Government, and an allocable share of the company's costs is charged to the Government.

Cost analysis and price analysis are different techniques, but they are not used on an either/or basis. You should use price analysis techniques to complement those of cost analysis when you make your price decision. Even if you are buying a sole-source item the design of which is subject to change, you should be able to develop and use certain cost estimating relationships (the most rudimentary of which might be cost per pound or cost per pound of thrust) before deciding on a realistic cost objective.

If both cost and price analyses are necessary, the resulting contract will be FFP if conditions permit, but some other arrangement may be more appropriate. On the other hand, any time you can get the job done with price analysis alone, the resulting contract should be FFP.

2.7 Testing for Competition

In section 2.4 above, we said that four conditions had to be met before effective price competition could exist. There had to be at least two offerors, each able to satisfy the Government's requirements, independently contending for a contract to be awarded the offeror that submits the lowest evaluated price, and each submitting priced offers responsive to the solicitation's requirements.

To see whether price competition really exists, you may examine prices, the range of prices offered by competing companies, the experience of the competing companies in making the item or doing the work, and the exceptions taken by any offeror to the specifications, delivery schedule, or other terms of the request for proposals (RFP) or request for quotations (RFQ). You will want to be sure the competing companies understand your requirement and are proposing or quoting on the same thing.

If the price competition is judged to be effective, it follows that the price is fair and reasonable. In that case, even when the procurement is for more than $100,000, it is exempt from the requirements for cost or pricing data and the contractor's certification that the data are complete, accurate, and current. But you may not have anticipated adequate price competition and, consequently, have already asked for and received cost or pricing data from the offerors. If you subsequently decide that competition has set the price, you do not have to use the data or have it certified.

If you decide that the four conditions have been met, you can assume price competition unless:

a. You discover that the low offeror has a lock on the competition (for example, it may have written off all costs of special tooling and plant rearrangement to earlier sales, or the offeror may be the manufacturer of a vital component that others must buy from it).

b. You find that the conditions of the solicitation unreasonably denied one or more known and qualified sources the opportunity to compete.

c. You can show, with facts, that the lowest price you have been able to negotiate is not reasonable and your boss (somebody above the contracting officer) agrees that you've done everything possible to negotiate a reasonable price.

A price can be based on adequate price competition even when there is not direct competition between would-be sellers. This "based on" concept can be illustrated by two situations in which you could conclude that the price is reasonable. The conclusion depends on a comparison with current or recent prices for the same or similar items bought in comparable quantities under contracts awarded after adequate price competition. One situation is an option price under certain conditions. The other is an item normally bought competitively but which, for good reason, is not bought competitively this time. Comparison with the competitive prices previously paid shows that the price offered clearly is reasonable.

As a variation on the second situation, assume that an end item with commercial as well as military uses and sales was bought competitively. The spare parts that support the equipment were priced on the first procurement at list less 40 percent. Comparable additional quantities could be purchased at 40 percent off list, without cost or pricing data, and justified as prices based on adequate price competition.

We owe you a warning. Any time there is only one source for a given item, competition is impossible. We say this to remind you that even if you have two offers, one from the vendor and the other from the prime, and the vendor is the source on both offers, you may have but one responsible offeror and therefore no price competition.

Some procurements give every indication of being competitive. Some maintenance and overhaul programs fall into this category. A small company can exist as a maintenance contractor and hold its own in competing for business. It is more important for the company to have shrewd management and a skilled cadre than to have a big payroll and a significant investment in plant and equipment.

In this environment you can get many responses to an RFP, each offer from a qualified source, and several of the offers may compare favorably with earlier contract prices. Some offers may even seem quite low. If it were not for the nature of the work (in this instance repair and overhaul of equipment), you would be justified in concluding that you have a prime example of competitive procurement. Because of the nature of the work, however, you must analyze the proposals carefully before you can decide on source and price. You might need to get cost or pricing data and analyze the costs, even though competition seems to exist.

The unknowns in maintenance contracting are the times when equipment will be made available for repair and its condition. While it may be possible to list and price in advance all the work that might have tc be done, you rarely will be able to specify the work that actually will need to be done on each of the equipments shipped in for repair. You frequently fix the prices of as much of the work as you can and then provide a way to authorize and price out the work (sometimes called *over and above*) that cannot be specified in advance. A competing company may decide to hedge its offer, betting it will be able to identify much of the borderline effort into the over and above rather than the fixed-price area. A contractor that can do this gets a significant measure of price relief.

Two results would make cost analysis worthwhile even if the price competition is as real as it seems. One would be the clear delineation of each offeror's concept of the job to be done, thereby enhancing source selection. The other would be a more precise identification of the work to be done for the prices in the contract, thereby limiting later disagreements in the over and above area.

The existence of effective competition may be difficult to determine if you are buying to performance specifications. Under such conditions, all respondents may propose products to meet the specifications, but no two of the products may be alike in anything other than claimed performance characteristics.

To use an unsophisticated example, assume a procurement using a performance specification that calls for an eight-ounce personal coffee container. One offeror proposes to furnish a paper cup. The other proposes to furnish a ceramic mug. Both meet the requirements, but they have different characteristics.

Does the fact that the price proposed for the paper cup is lower than the price for the mug mean that the cup price is reasonable? It might not be, if you find other companies to sell you paper cups that meet the specs. Additionally, the price might not be reasonable if the ceramic mugs last 100 times longer than the paper cups. In other words, where the specs can result in proposals to furnish unlike products, you need to do further analysis beyond a comparison of competing offers and, quite probably, to negotiate before deciding that one or another price is reasonable.

You should recognize that good procurement practice may dictate a technical competition. After you have selected the source on technical grounds, price becomes the issue. Maybe the selected item has been sold to the general public in substantial quantities at established catalog or market prices. If not, and if the product differences are as great as in the example, you will have to treat the winner as though it were a sole source and get and analyze cost or pricing data and negotiate a reasonable price.

2.8 Established Catalog or Market Prices

Law and regulations exempt contracts for products with established catalog or market prices from the need for cost analysis if four conditions are met. The act of determinining that all the conditions are met is a form of price analysis. You must evaluate, case-by-case, to determine whether the price is, or is based on, (1) an established catalog or market price (2) of a commercial item (3) sold in substantial quantities (4) to the general public.

An *established catalog price* is a price included in a catalog, price list, schedule, or other form that is regularly maintained by the manufacturer or vendor, is published or otherwise available for inspection by customers, and states prices at which sales are currently or were last made to a significant number of buyers constituting the general public.

An *established market price* is a price currently established in the usual and ordinary course of trade between buyers and sellers free to bargain. It must be established from sources independent of the manufacturer or vendor.

A *commercial item* is an item (the term includes both supplies and services) of a class or kind that is regularly used for other than Government purposes and is sold or traded in the course of normal operations.

Supplies are *sold in substantial quantities* when the facts or circumstances support a reasonable conclusion that the quantities regularly sold are sufficient to constitute a real commercial market for the item. This test is usually in terms of total quantities sold, but it also should include the number of times the item has been sold and how many times a given price or price structure has been accepted by buyers free to choose. Nominal quantities, like models, specimens, samples, and prototype or experimental units don't meet this requirement.

Services sold in substantial quantities are those that are customarily provided by the company, with personnel regularly employed and with equipment, if any is needed, regularly maintained either solely or principally to provide such services.

An item is *sold to the general public* if it is sold to other than affiliates of the seller for end use by other than the Government. Items sold to affiliates of the seller and sales for end use by the Government are not sales to the general public.

Determining whether any one or more of several conditions apply will give you a basis for deciding whether the price is reasonable. It may not take much more to reach your decision. Section 9.1 deals specifically with the special requirements of determining whether a given item qualifies for exemption.

2.9 Techniques

All price analysis techniques require comparing the proposed price with other prices, purchase request (PR) estimates, or independent cost estimates. Comparison is made to provide the basis for either accepting the proposed price or bargaining further with the offeror. Many times, comparison will expose differences that must be reconciled before a decision can be made. When you make comparisons, you must be sensitive to, and make allowances for, differences in specifications, quantities, time for delivery, and amounts of Government-furnished materials and to improvements in efficiency.

Price comparison

Comparative price analysis involves comparing a proposed price with another price or other prices. The base price may be another company's offer on the same procurement, or it may be prices paid on earlier procurements of the same item or similar items. In any of these comparisons, it is important to be sure that the base price is fair and reasonable, that it is a valid standard against which to measure the offered price. If a past price is being used, it is not enough for the present offer to be lower than the last price paid or even lower than all prices previously paid. Consider the example of an item bought repetitively from the same company (Table 2-1).

TABLE 2-1

BUY	QUANTITY	UNIT PRICE
1st	180	$86
2nd	200	79
3rd	172	70
Present	212	58

A steady downward trend in price is pleasing to a buyer, but it is not proof of reasonableness. Unless the reasonableness of one of the previous prices has been established by competition, by detailed cost analysis, by an engineering estimate, or by testing the market for the same or a similar item, the present offer may still be unreasonably high.

There is little variation in the quantities shown in the example. For there to be comparability, there can be little difference. As a rule, we expect to pay less per unit as the quantities purchased increase. This is why consolidation of requirements is continually urged.

However, it does not follow that a proposed price that is lower than the last purchase price is reasonable just because the present quantity is greater than the last. Neither does the coupling of a higher price with a smaller quantity prove a price to be reasonable. In either case, the relationship is a logical one we would expect to find, but this does not make the price right. Other factors to look into are the kind of item, the number to be purchased in relation to the number sold in a comparable time period, and the existence of a price list, with quantity breaks, that may be used in selling the item to all classes of customers.

Price comparison usually is a starting point that reveals differences that need to be explained before a price decision can be made. Explanation often can come from Government sources, either the experience and judgment of buyer or supervisor or that of other organizational elements. The offeror may be the only source for needed answers, however, and you usually will need to talk to the offeror before you can make up your mind. However, when you analyze differences, don't mislead yourself by accepting a plausible answer for an actual one. For example:

a. "Material and labor costs have gone up in the two years since the last purchase. Therefore, the higher price for this part is justified." A general increase in material and labor costs may not influence the unit cost of a particular part unless the price of the actual material used has gone up and unless there have been no compensating economies in material and labor used, manufacturing methods, or indirect expenses.

b. "The last buy of this item was made while the end item was still in production. Now, as an out-of-production part, it must take full setup costs spread over a smaller quantity. The price increase is justified." The last buy could have been made while the end item was being manufactured, but the particular part may have been produced by a special, small-quantity run at that time and may have carried a full setup charge. Further, machine runs in economical lot sizes may mean manufacture or purchase of parts in quantities and at times that have little relationship to end-item delivery schedules.

Price comparisons require easy access to price history on a line-item basis. Parts history cards or printouts showing price, quantity, contract, date, contractor, and delivery, as a minimum, should be available in each buying organization. Be careful, though, in using these prices. The mere fact that past prices exist doesn't make them valid basis for comparison. You also must establish production or delivery rates, kind of procurement (provisioning, competitive, sole-source, or similar characterization), and the presence (or absence) of special considerations before you can decide about using a price as a standard.

Government catalogs

Prepriced spare parts contracts, called catalog arrangements, can be established. The items generally are those that must be bought from the contractor as a sole source and are selected and priced out in advance of any specific requirement. The result is a Government version of a commercial catalog that can be used in the same manner as its commercial counterpart. The difference is that you participate in its development and use cost as well as price analysis to develop the prices and pricing terms. This one action establishes prices for a specified period and reduces the pricing on orders placed during that period to a perfunctory check of the prices already in the contract. This effectively eliminates the buyer's problem in pricing out small quantities purchased from the contractor.

Section 9.2 discusses the importance of having a system for analyzing spare parts exhibits and knowing the company's spare parts pricing policies and practices. By itself, knowing how a company prices spare parts and how Government personnel review the priced spare parts lists does not guarantee the reasonableness of spare parts prices. However, when added to the facts developed by analysis of a specific offer, the knowledge that the company has an acceptable method of pricing spare parts and that the Government is continually checking the system's output for reasonableness and compliance may permit a decision on reasonableness.

The following examples demonstrate two approaches to parts pricing:

a. An offer of $2,200 (one item, unit price $11, no competition, no price history, PR estimate unreliable). Physical inspection supports the conclusion that the unit might be worth $11, but the buyer isn't ready to sign off. The buyer checks with the pricing office or the administrative contracting officer (ACO) and finds that an agreement exists and that the Government field people are on top of spare parts pricing. They spot check regularly and hit small- as well as large-dollar items. With the added assurance this gives, the buyer decides that the price is fair and reasonable and makes the award.

b. One offer, spare parts list with 25 line items, total price $27,520. The buyer selects four line items that account for $19,323 of the total. The buyer compares these with past prices, looks at the parts themselves, and establishes that the present prices are within the range. The buyer verifies the pricing arrangement with the pricing office, decides the prices for the list are reasonable, and makes the award.

Government estimates

An offered price may be compared with the PR or other Government estimate to establish reasonableness when price comparisons are not possible. To be useful, however, the basis for the estimate and its reliability must be established. The important things to find out are how the estimate was made, what information and tools were used, where the information came from, and how earlier estimates stacked up against resulting contract prices. It may also help to know who made the estimate.

The PR estimate can be a valid standard for comparison if it is based on a realistic engineering analysis or if the originator has used a reasonable past purchase price and identified the quantity. A realistic engineering estimate of what an item should cost could be developed after study of the drawings, after physical inspection or tear-down of a sample, or by analysis of similar work and projection of price based on the findings of the analysis. Again, however, the buyer should compare earlier estimates derived in the same fashion with the resulting purchase prices before deciding on the reliability of the estimate.

Too often, PR estimates are not reliable. Stock list prices, a frequently used source, can be misleading unless they are continually updated and annotated to indicate quantity, date of purchase, and production rate. Lacking any other basis, the originator may occasionally make an outright guess, an unreliable basis for price comparison.

Value analysis

Knowledge of the product, its functions, and the use to which it is to be put is essential for sound contract pricing. When applied to price, value analysis is intended to establish the value of the product, how much it is worth to the user. More precisely, value analysis is a systematic and objective evaluation of the function of a product and its related costs, whose purpose is to ensure optimum value. Questions that help the valuation are:

a. What does the product have to do?

b. What does it cost now? What prices do we pay and what does it cost to operate and maintain?

c. What other ways can the function be performed?

d. What will these alternatives cost?

Use of value analysis as a pricing tool can give insight into the inherent worth of the product. Cost analysis determines whether the cost of the product is reasonable in its present design, using present materials and finishes. Value analysis, on the other hand, determines whether the product, as it is now constituted, is the best product in terms of value. Certain features might be modified or eliminated, or there may be an alternative product or an alternative process to provide the required function at a lower cost. You may be able to get this kind of analysis from an engineer.

Value analysis techniques may be applied to any product, regardless of the product's complexity. However, the complementing detailed evaluation of cost factors in a complex product would be time-consuming and costly. Therefore, only those items that offer the highest potential for cost reductions, when compared to the time and cost of analysis, should be looked at in detail.

For low-potential items, a brief survey can usually provide adequate value analysis. Questions to ask in such a survey are:

a. Can the product, or any part of it, be eliminated?

b. Can a standard part replace a special one?

c. Can a lower-cost material or method be used?

d. Are paperwork requirements excessive or unreasonable?

e. Can parts be packaged more economically?

Visual analysis

This term identifies an approach related to value analysis. A companion term is *eyeballing*. The term describes inspection of an item or the drawings of an item, to come up with an estimate of its probable value. Visual analysis is closely related to the value analysis survey, in that you are concerned with the answers to questions about obvious, external features.

By itself, this type of analysis will rarely answer all questions. It should be used to verify tentative conclusions reached after price comparison. It will lend credence to spare parts prices from a major Government supplier with an acceptable method for pricing spare parts. It will provide a sound talking point for negotiations with an offeror. It will flag unrealistically high prices for common items.

2.10 Specific Guidance

We have discussed the meaning and intent of the factors involved in price analysis and directed your attention to the pricing of relatively small-dollar procurements. The fair and reasonable price, price analysis, competition, established catalog or market prices, and comparisons have been treated in some detail. The discussion has been written from the point of view of the buyer as the key person pricing these procurements, the person who must do the work. It has treated the questions generally, without saying how small a small-dollar procurement is or what to do when pricing a $125 buy, a $2,312 buy, or a $15,795 buy.

Several general factors should guide you in doing price analysis. Some of them change depending on the dollars involved.

a. Purchases categorized as small purchase. If the procurement falls into this category, you will use the simplified small purchase procedures set forth in the acquisition regulations. When you analyze, remember that these procedures are designed to reduce administrative costs and eliminate costly and time-consuming paper processes. Therefore, you won't do some of the things that might be appropriate to larger procurements. You won't request Government estimates or field pricing assistance, and you won't do cost analysis. You definitely should not rely on unevaluated past prices or prior estimates. You will follow local prenegotiation review procedures and you will follow regulations in documenting your actions. If the procurement is in the low range of the small purchase category, don't go overboard in analysis; the price may have been set in the marketplace.

b. Purchases exceeding the small purchase limit. You will follow local prenegotiation review procedures and comply with regulations in requesting cost or pricing data and making awards. You will restrict documentation to the facts that show what you did and why the price is right. You won't award a contract, except in the few instances spelled out in regulations, without conducting written or oral discussions with all in the competitive range, and you won't assume competition is present when one offeror is the prime contractor and the other is the vendor who makes the item. You won't use unevaluated past prices or estimates in your analysis.

If the procurement is below the threshold for requiring cost or pricing data, you won't request a Government estimate for pricing purposes unless the procurement is for a new item with a high unit price or one with significant future buy potential. You won't request field pricing assistance and you won't request cost analysis unless price analysis has proved inadequate to justify the price. If you request cost analysis, you will direct it at specific costs and require less-than-complete cost or pricing data if the pricing job can be done without complete data. You will restrict the extent and depth of any analysis to what is appropriate to the dollars.

The decision chart shown in Table 2-2 lists the actions you will take on negotiated procurements:

a. Of $1,000 or less.

b. Over $1,000, but not over the small purchase limit.

c. Over the small purchase limit, but not over $100,000.

d. Over $100,000.

The chart sets out pricing actions in a go/no-go sequence. You start with full and open competition and go only as far as is necessary to assure yourself that the price is right. Start with evaluation of proposals. If you decide that price competition exists, stop working; the price is right. If competition is not effective, look to catalogs and market prices. If these do not do the job, move on to comparison of offers with past prices. And, if no price analysis methods work, it may be necessary to use cost analysis techniques. These are covered in Chapter 3.

TABLE 2-2. PRICING – A DECISION CHART

(By Order of Precedence – Award When Satisfied That Conditions Are Met)

BASIS FOR DECISION*	NO. 1	NO. 2	NO. 3	NO. 4
Competition	If prices considered reasonable	Solicit from a reasonable number	Maximize	Maximize
Catalog or market price	Good source	Acceptable	Acceptable	Acceptable
Past prices	Acceptable	Acceptable	Acceptable	No
Government estimate	Acceptable	Acceptable	Acceptable	No
Value analysis	Acceptable	Acceptable	Acceptable	No
Cost or pricing data	No	No	Permissible (certification not required)	Certification (if required)
Negotiate	Last resort	Permissible	Permissible	Yes

*KEY: No. 1 (Purchase not over $1,000; No. 2 (Purchase over $1,000, but not over small purchase limit); No. 3 (Purchase over small purchase limit, but not over $100,000); No. 4 (Purchase over $100,000)

Analysis and decision on the job need not follow this start-stop-start sequence, and it often may take less time to do it than to read about it. Your experience will frequently permit you to take shortcuts to reach the decision that an offer should be accepted or that it should be negotiated to an acceptable level. This is the objective, anyway: an acceptable price achieved with the minimum expenditure of time and effort. Remember, the minimum analysis will be set by the present value of the procurement and the cost, in time and manpower, of proceeding to the next level of detail in analysis.

Suggested Readings

Standards for Judging Price

FAR	15.801	Definitions
	15.805	Proposal analysis
	15.805-1	General
DFARS	15.805-1	General
FAR	15.805-2	Price analysis
DFARS	15.805-2	Price Analysis

FAR	15.805-3	Cost analysis
	15.805-4	Technical analysis
DFARS	15.805-4	Technical Analysis

Testing for Competition

FAR	15.804-3(b)	Adequate price competition
DFARS	15.804-3(c)	

Techniques

FAR	15.805-2	Price analysis
DFARS	15.805-2	Price Analysis

CHAPTER 3
Costs and Cost Analysis

CHAPTER 3

COSTS AND COST ANALYSIS

CONTENTS

3.1 Cost Defined . . . 3- 2

3.2 Cost-Based Prices . . . 3- 3
  What is a good price? . . . 3- 3
  Will-cost . . . 3- 4
  Will-cost versus should-cost . . . 3- 4

3.3 Contract Cost Principles . . . 3- 5

3.4 Contract Cost Analysis Defined . . . 3- 5

3.5 Realistic Pricing . . . 3- 6

3.6 Cost Accounting . . . 3- 7

3.7 Cost Estimating . . . 3-10
  Round-table estimating methods . . . 3-11
  Estimating by comparison . . . 3-11
  Detailed estimating . . . 3-12

3.8 Sources of Cost or Pricing Data . . . 3-14

3.9 Estimating Techniques and Tools for Quantitative Measurements . . . 3-15
  Descriptive statistics . . . 3-15
  Indices . . . 3-18
  Probability . . . 3-21
  Sampling . . . 3-22
  Hypothesis testing . . . 3-23
  Forecasting . . . 3-25
  The learning curve . . . 3-28
  Cost estimating relationships (CERs) . . . 3-32
  Computers and cost models . . . 3-33

3.10 Contract Pricing Proposals . . . 3-34
  Identification . . . 3-35
  Responsibilities . . . 3-36
  A closer look at the SF 1411 . . . 3-37

3.11 Cost Analysis 3-43
  Cost estimates 3-44
  Certified cost or pricing data 3-44
  Cost accounting standards 3-46
  Contract cost principles 3-46
  Dollar value 3-48
  Ratio of Government to total business 3-49
  Inventory position 3-49
  Uncertainties 3-49
  Technical analyses 3-51
  Should-cost 3-53

3.1 Cost Defined

The term *cost* has two meanings. It can refer to the amount of money the Government spends to acquire an item or it can mean that cost plus all costs of operating and maintaining the item once acquired. When people in budgeting, accounting, program management, and material management talk about cost, they may be using the term in the latter sense, the Government's total cost of ownership. On the other hand, cost, to contracting people, usually means the total cost a contractor incurs in fulfilling the contract. Cost and an amount representing profit to the contractor are the contract price -- the cost to the Government.

There is a further dichotomy regarding costs in the pricing of Government contracts. Basic procurement law says that procurements will be made by means of full and open competition, with but few exceptions. Sealed bidding is one competitive procedure; under it, award is based essentially on price, arrived at competitively, and both the cost of performance and the profit earned are the contractor's business. When competition is present, the Government subordinates cost and profit to price. The lowest price from a responsive, responsible seller is usually held to be fair and reasonable.

This view of competitive price is consistent with the concept that, in the commercial marketplace, price comes first and products are designed to permit manufacture and sale, at a profit, at that price. The idea is that price is independent of cost, and the manufacturer who cannot sell profitably at the competitive price will get out of the market. Quoted price is seen to be a maximum that can be lowered at the discretion of the seller, but not raised. In this circumstance, profit is thought to be a function of demand and efficiency.

Despite the preeminence of competition, in many procurements that account for a significant proportion of total budget dollars, government negotiators establish price after evaluating the estimated costs of contract performance and bargaining to reach agreement on the money to be paid for that work. In a very real sense, a price doesn't exist until one is established by negotiation between the parties. Therefore, this chapter examines costs and the way they are used in acquisition and considers the importance of cost and profit in pricing.

Typically, in particular reference to things the Government buys to its specifications, price is believed to be the product of an orderly process: (1) the Government defines a requirement with specifications; (2) the contractor estimates the cost to produce to the specifications; and (3) the contractor calculates the profit or fee desired for the work to be done at the estimated cost. It follows that the company is asked to support its proposal with a detailed breakdown of price into estimated elements of cost and profit or fee so that the Government can evaluate the proposal on the basis that cost plus profit equals price.

3.2 Cost-Based Prices

Contract pricing is a real challenge only when effective price competition is lacking. Much of procurement policy and practice has developed to safeguard the Government's interests when it must price on a cost-plus basis. This cost-plus pricing is based on the concept that specifications determine cost and that profit is payment for doing the work at that cost.

Many companies, in addition to defense and aerospace contractors, price on a cost-plus basis. These are the regulated monopolies like utilities and pipelines. Others, whether they actually do it or not, appear to do the same thing, if only because they must take in more than they spend if they are to survive.

The cost-plus theory of price is that price is a direct function of the cost to perform and a fair price is a combination of (1) an accurate representation of cost and (2) a fair profit. The emphasis on audit, detailed cost principles, and cost accounting standards is a logical extension of the belief that meaningful negotiations demand accurate cost representations and that accuracy, in reference to estimated costs, is not an anomaly.

What is a good price?

When cost-plus pricing is performed, cost analysis is used to establish the basis for negotiation of the contract price. Costs are analyzed to determine whether the total cost estimate approximates the dollars it should cost to perform the contract if the company operates with reasonable economy and efficiency. Agreement to buy at a particular price is the contracting officer's decision, and cost analysis provides a standard to help make that decision.

Price is a business decision that seller and buyer reach jointly. It is a product of judgment influenced by bargaining strength and, in a commercial environment, by economic realities dictated by the market. Estimated cost is one basis for judgment, as is the cost (price) of alternatives and alternative sources. Prices paid in the past are a guide. Ability as well as willingness to pay is obviously a practical test of an offered price.

Reasonable cost plus a fair profit is the standard in cost-plus pricing, but this is not an objective standard with the same utility as competitors' prices. It still requires a decision, based on subjective evaluation of a proposal tendered by a seller who is free, in the instant case, from the pressures competition exerts on costs and prices. What is a reasonable projection of future costs? What is a fair profit?

The profit netted on a contract often is used to judge whether the price paid was good and whether the contracting officer was a faithful steward of public funds. This standard means the price is acceptable if the rate of profit realized approximates that originally contemplated. If the rate is higher, there may be the presumption that the price was too high. Contracting personnel and their overseers rarely are concerned if the profit realized is less, in rate or dollars.

The principal weakness of profit earned as a standard for judging price is that it rarely involves an analysis of why the profit was earned. In addition, it is closely related conceptually to illegal cost-plus-percentage-of-cost (CPPC) contracting. Both place a premium on the ability to incur costs. In the case of CPPC, the higher the costs, the greater the profit. In cost-plus, the closer final cost is to estimated cost, the less likely it is that anyone will be criticized.

This doesn't help very much. If fair and reasonable is a difficult standard for identifying a good price, how much better off are you with "reasonable" estimated costs and "acceptable" or "fair" profit as standards?

Will-cost

Pricing a contract on the basis of estimated costs requires that the offeror support the proposal with an estimate of what it will cost to do the job in a specified future period. The offeror must back up that estimate with projections from current, actual costs of the same or similar work to the extent actuals are available. The offeror is also required to reveal the assumptions made and the rationale followed in extrapolating from current actuals to future estimates. Because there is no competition, the offeror can be expected to minimize risk of loss by pricing well above what the costs are likely to be.

This general statement doesn't describe how an individual contractor prices contracts. That will vary from contractor to contractor and, within the same company, may vary depending upon the kind of product or service being sold.

Pricing is different when costs of performance are known or can be approximated. Actual costs are tested for allowability, allocability, and reasonableness. The price ultimately negotiated probably will cover the costs that meet those tests; in this case there is a close relationship between cost and price. This occurs in cost-reimbursement contracts, in fixed-price contracts that provide for establishing firm prices during or at the end of the contract, and in pricing certain modifications to both cost-reimbursement and fixed-price arrangements.

Dissatisfactions with the will-cost basis for pricing stem from the dependency on the contractor for data to analyze the offer, the implied commitment to accept ongoing, fixed costs of being in business, and the likelihood that the projection of past costs will perpetuate past inefficiencies.

Will-cost versus should-cost

A more sophisticated approach is to take the contractor's proposal, the estimate of what it will cost, evaluate it, and then try to answer the question: "Has the contractor challenged subcontract and other material costs and taken into account the most efficient production methods, considering all circumstances, in preparing the proposal?" This second approach has been labeled "should-cost" to distinguish it from estimating techniques that may extrapolate prior inefficiencies that have persisted unchecked or that have not been purged from the historical data used to estimate the new work.

It is hard to argue against the proposition that, when the Government has no choice but to procure needed items repetitively from the same contractor, the contractor may become inefficient and not properly attentive to economy of operation. The literal cost-plus approach is to determine actual costs and to use them as the basis for pricing the contract. The should-cost idea goes further. It accepts the need for cost-plus pricing in noncompetitive procurements but uses Military Standard (Mil-Std) 1567A, Work Measurement, and industrial engineering methods to help produce results similar to those attributed to competition.

The should-cost approach can be implemented, as it has been, by forming an ad hoc team to study a major program proposal. It also may be built into day-to-day analysis by implementing the work measurement standard and by challenging existing and proposed procedures, processes, manning, skills, and other aspects of the proposal.

Not all benefits of a formal should-cost study may be realized in the instant procurement, because a study customarily involves total plant or profit center operation and sets in motion changes in the organization, procedures, and equipment acquisitions or dispositions that will not be completed within the life of the contract that occasioned the study. Because it requires substantial personnel resources of high caliber, demands cooperative participation of the contractor, and inevitably disrupts current and affects future operations significantly, a formal should-cost study is not a routine remedy.

3.3 Contract Cost Principles

Contract cost principles published in FAR are the rules for allowance of costs in negotiating cost-reimbursement contracts and making payments thereunder and in pricing all contracts and modifications whenever cost analysis is performed.

The cost principles are used to identify costs when cost-reimbursement pricing is performed. FAR says that the total cost of a contract is the sum of the allowable direct and indirect costs allocable to the contract, incurred or to be incurred, less any allocable credits. Any generally accepted method of determining or estimating costs that is equitable under the circumstances may be used. This includes using standard costs properly adjusted for variances.

After costs are identified, they are evaluated to determine the allowability of individual items. Reasonableness, allocability, compliance with disclosed practices and existing cost accounting standards, application of generally accepted accounting principles and practices appropriate to the particular circumstances, and any contract limitations on types or amounts of cost items are factors considered in the evaluation.

3.4 Contract Cost Analysis Defined

Contract cost analysis is the element-by-element examination of the estimated or actual costs of contract performance. It involves analyzing cost accounting data furnished by the offeror or contractor. It also involves analyzing design features, materials, manufacturing processes, organization and manning, and estimating assumptions; all these are cost factors that contribute to the total cost of a procurement.

Cost analysis includes verification of cost data, evaluation of specific elements of cost, and projection of these data. Cost analysis looks into such factors as:

a. Need to incur costs.

b. Reasonableness of amounts estimated for necessary costs.

c. Extent of uncertainties of contract performance and realism of any allowances for contingencies.

d. Bases for allocation of overhead costs.

e. Appropriateness of allocations of specific overhead costs to the contract.

When data are available, a contractor or offeror's estimated costs may be compared with:

a. Actual costs incurred previously.

b. The last prior estimate, or series of prior estimates, for the same or a similar item.

c. Current estimates from other offerors.

d. Prior estimates or historical costs of other companies for the same or similar work.

Cost analysis also includes analysis of trends in costs. In periods of changing levels of cost, analysis of economic trends is essential. Even in periods of relative economic stability, and particularly in cases involving production of recently developed hardware, trends in direct material and labor costs must be analyzed.

Contract cost analysis is performed by accountants, auditors, price analysts, negotiators, engineers, and production specialists; in short, by almost anyone who can be drafted by the contracting officer to help with this part of the job. Who does this job is not important, but it is important that it be done thoroughly and with imagination.

Contract cost analysis is used to establish the basis for negotiating contract prices when price competition is inadequate or lacking altogether and when price analysis, by itself, does not assure the reasonableness of prices. If the work has been done, you analyze the costs to establish the relationship between the actuals and what the work should have cost, assuming reasonably effective operations. After completing the analysis, you use the conclusion as to what contract performance should (or should have) cost to develop the price objective you will take into negotiations with the company.

Major emphasis has been placed on getting and analyzing accounting data. Public Law (P.L.) 87-653 (Truth in Negotiations) and P.L. 91-379 (Cost Accounting Standards) reinforce this emphasis. However, other skills and other data contribute greatly to pricing. Parametric estimating, which relies on statistical techniques, is used in both budgetary and contract cost estimating. Indirect cost monitoring programs use budgeting and industrial engineering techniques, in addition to cost accounting, to make sure contractors control indirect costs. Should-cost uses all the analytical skills in concert to evaluate estimated contract costs and uses the product of this effort in negotiations. All of these are prominent in dealings with major contractors for major acquisitions.

You can improve cost analysis if you also consider the contractor's practices, strengths, weaknesses, and unique problems as these may be pointed up in analyses, surveys, and system reviews performed by various Government organizations. These include estimating system surveys, contractor purchasing system reviews, defective pricing audits, accounting reviews, financial capability surveys, compensation reviews, reports on specific functional areas, and General Accounting Office (GAO) reports. You should find out what reviews have been made, examine the significant findings related to your negotiation, and use them in pricing the contract and writing the contract terms.

3.5 Realistic Pricing

The concept of realistic pricing ties in closely with the idea that cost analysis is used in the absence of price competition to achieve what competition is presumed to supply: a pricing arrangement likely to result in payment of a fair and reasonable price. You use cost analysis to uncover the facts needed to reach agreement on such an arrangement. For the arrangement to be realistic, it must be influenced strongly by the estimate of what it should cost to perform if the contractor operates with reasonable economy and efficiency.

Realistic pricing recognizes that you deal with estimates of future events and cannot expect to hit those costs on the button with 100-percent accuracy. If you try too hard for accuracy, it becomes easy to rationalize use of a cost-reimbursement arrangement or a long-lived letter contract followed by a cost-reimbursement arrangement. Either that, or you will find a way to negotiate a fixed-price arrangement so that it becomes the practical equivalent of cost reimbursement. On the other hand, realistic pricing does not mean you are expected to try for pricing arrangements that would spell loss to the contractor unless every good thing that has to happen does happen.

To be realistic means to be reasonable, to recognize the nature of a contract pricing proposal, and to understand that an estimate is a prediction of the cost of future events. You know some events will occur, and you can predict them with some measure of confidence. You are not so sure about others, but you know they may occur, and, if there is a reasonable certainty that they will, the estimate will provide for them as well. You would call them contingencies.

Contingencies take many forms, and you can expect to find one or more in every proposal. Some examples:

a. Labor or material price escalation.

b. Changes in the labor base and their effects on overhead rates.

c. Changes in manufacturing processes, their effects on labor and material quantities, and the offsetting effect of overhead.

d. Warranty requirements for assuring performance aspects.

e. Possible changes in tax rates.

f. Changes in average unit time to produce articles as a result of increased skills or training.

In analyzing costs, you attempt to isolate such contingencies and identify the amounts estimated to cover them. Your objective is to negotiate a realistic pricing arrangement based upon knowledge of all current and correct cost or pricing data available to the contractor and the Government at the time of negotiation. To the extent actual costs have been incurred, your knowledge of them will temper the forecast of what it should cost to do the job. Also, the type of pricing arrangement negotiated must be right for the projected situation, or the price ultimately paid may not be fair and reasonable in relation to the quality of performance actually achieved.

After negotiations are completed and the contract is awarded, several factors could arise during performance to cause the contractor's costs to be greater or less than estimated. Among these factors are innovations made by the contractor subsequent to award; substantial changes in production volume; unexpected development, test, or production problems; unanticipated program changes that did not require a contract change; and contingent events that either did not materialize or did not materialize to the degree predicted. The likelihood of such factors occurring and their possible impact if they do occur are the uncertainties involved in contract performance.

These uncertainties make it difficult to estimate the final cost. For this reason, you will usually estimate the range within which final costs will fall rather than attempt to predict the exact amount. In addition, you will usually propose a pricing arrangement consistent with that range.

To summarize, you will evaluate the extent and nature of uncertainties at the time of negotiation. This evaluation is a key step in assuring agreement on a realistic pricing arrangement.

3.6 Cost Accounting

These comments on cost accounting introduce a complex and difficult subject. They do no more than that. If you have questions about accounting matters, consult the auditors.

Cost accounting systems vary widely according to the product or service sold, the types of contracts or marketing involved, and the complexity of the operation. Differing situations and conditions cause each company's management to expect and demand many different things of the data produced. You must understand the company's system and how it will affect the costs to be charged to your contract.

Accounting system means the system used by a contractor to assign costs to contracts. The system can include memorandum records as well as formal accounting books and records. Many accounting systems developed for commercial purposes do not develop the total absorption of costs required for Government contracting.

Nearly all Government contractors must keep memorandum records to accommodate to differences in tax laws, requirements of generally accepted accounting principles, and management accounting practices. The memorandum records are acceptable if they are reconciled to the company's general ledger.

Some of the differences that make memorandum records necessary are:

a. Depreciation lives or rates for financial statements that are different from those used for contract costing.

b. Use of standard costs for management accounting but actual costs for Government cost determination.

c. Costs charged directly to cost of sales for commercial work but charged to work-in-process for Government work. (This includes the allocation of G&A expenses to contracts.)

A large contractor probably will have filed a disclosure statement describing the accounting methods used. The disclosure statement will have been reviewed by a Government auditor, revised if necessary, and then approved by a contracting officer. The disclosure statement will help answer questions on how the company's cost accounting system works and how it will affect your contract.

The contractor is required to book and report costs following the practices disclosed. A contractor that has not been required to submit a disclosure statement still must accept the cost accounting standards clause in the contract and follow the standards promulgated by the Cost Accounting Standards Board (CASB).

Cost accounting has been called the language of business. If designed properly, it tells workers what management expects of them and tells management how the workers did. By reviewing this language exchange, the Government can assess how well the company is planning and controlling its operations and, if cost is a prerequisite to payment, how much the Government owes the contractor.

Cost accounting systems can do much for the negotiator before contract costs are incurred. Past cost for similar jobs can help predict future cost. Past budgets and related actual cost can help show how the contractor manages the business and tell you something about budgeted versus proposed cost. The degree of responsibility for cost control built into the system can help decide how effective the contractor will be in controlling cost on your contract; this could affect the pricing arrangement.

Most cost accounting systems are difficult to characterize simply. Generally, they are said to be "actual" or "standard," but the actual is only relative, and the standard must be modified by variance adjustments to approach the actual cost. In either case, the cost accounting system produces approximations, not precise statements of the true cost. Because many estimates and allocations are involved in every cost system, "true" costs exist only in theory.

The commonly held concept of actual costs is that such a system records what is spent in performing a task and in conducting a business. Necessary refinements take the concept beyond this, however, and an actual cost system also will record accruals, prorations, and adjustments of actual and anticipated costs.

Standard costs are expected goals used to expedite the costing of transactions. However, actual expenditures also must be recorded and compared with the costs recorded on the standard basis. Differences between actual and standard costs will require an adjustment to reflect the variance.

It is not unusual for a company to use a combination of the two methods. A company may use a standard labor time base but a labor rate for costing that reflects actual dollars paid. In another instance, a company may employ a standard material price but an actual use count. If you understand the form of standard used, you should be able to identify troublesome areas directly from the data produced. This is possible because matters of efficiency, price level changes, and normal use will be included in standards or reflected in variances, and the data will identify major deviations automatically.

There are many acceptable methods for determining standards and many acceptable methods of allocating variances. It is possible to use one acceptable method for determining standards and another acceptable method for allocating the resulting variance. However, when used together, the results may be unacceptable without additional refinements. This is particularly true if, for example, a substantial plant-wide variance is applied across the board to all products.

Whether standards are close to actual, established early or late, changeable with changed conditions, or unchangeable is not important. What is important is that you be fully informed about them. Also, the company must be consistent and allocate variances to the various categories of products in relation to the proportionate effect the products have on the generation of variances.

Some firms use standard costs for commercial business and actual costs for Government work because the distribution of variances is not adequate for costing Government contracts. They use memorandum records to develop actual costs. This practice shouldn't cause problems in analyzing costs so long as gross variances are handled properly in allocating to commercial and Government work.

In addition to being classified as actual or standard, cost accounting systems may be classified as "process" or "job order." Under the process system, costs are accumulated by department or process during the period in which production occurs and are averaged over the units produced. Products removed from the production process during the period carry the prorated cost of the period. Under the job order system, costs are charged and accumulated against the specific job order until the job is completed.

The cost accounting system should be tailored to fit the company's operations and not the reverse. Any of the systems described here will produce information that will be useful in evaluating either historical or prospective costs. However, unless the system already is designed to furnish the required data, it may be costly and sometimes impossible to obtain the data later after costs have been recorded.

You may need to seek expert advice, not only about the verification of cost and cost factors but also about whether the accounting system will or can produce the factual cost or pricing data needed to evaluate proposed prices. If changes are necessary to provide more precise and timely data for price adjustment during or at the end of the contract, you should reach agreement on them at the time you negotiate the contract. That also is the time to make sure that the accounting system produces reliable cost data that can be audited and that the system is flexible enough to provide other data that may be required. You cannot press for changes that merely benefit a single contract or class of product to the detriment of others.

A cost accounting system should produce reasonably accurate unit costs and provide control over costs. It also should provide cost data for use in estimating and pricing, for measurement purposes, and for the guidance of management. Unless a cost accounting system reflects unit and total costs of individual contracts, you may not be able to use historical costs to evaluate an estimate.

You may find the offeror has used statistical data to develop and support the estimates backing the proposed price. These may be used if they tie into the basic accounting records and if subsequent adjustments to the accounting data have been cranked into the statistics.

For good reasons, there are many different cost accounting systems. The relationship between cost accounting and price is as follows: cost records should provide information (1) the company can use in estimating the cost of jobs it has been asked to quote on and (2) the buying activity can use in evaluating the reasonableness of the quotations submitted.

You will find a reasonable tie-in between a company's estimating methods and its cost accounting system. Standard 401 of the CASB, together with the functioning of P.L. 87-653 with its emphasis on accurate, complete, and current costs, makes this happen.

Cost accounting also produces data used for revision of contract prices, adjustment of incentive targets, negotiation of final costs of fixed-price incentive (FPI) contracts, reimbursement of costs under cost-reimbursement contracts, and other actions on existing contracts. A more complex accounting system will produce more detailed information, but it also may cost more and be more difficult to understand. You should ask auditors for advice on the adequacy and intricacies of specific accounting methods.

3.7 Cost Estimating

You must understand a company's estimating methods and procedures if you are to analyze estimated costs effectively. Understanding obviously isn't the whole story; any method requires judgmental decisions that will have a great impact on the soundness of the estimate. Before getting into the subject of cost estimating, look at two examples that illustrate the role of cost estimates in different situations and put the cost estimate into perspective.

In one situation, the company is competing for the development of a high-risk, high-technology product. Award will be made on technical factors and not price. In this case, the offeror's detailed cost estimate may be the tool that company management uses to plan the contract effort, to analyze the risks, and to establish a range of probable costs and a price level. However, for reasons discussed in the next paragraph, it may not be the real determinant of the price or estimate proposed.

After the cost estimate is developed, its elements may be challenged and changed in reviews by engineering, design, tooling, manufacturing, purchasing, and financial departments. Company management may test this most-likely cost figure against the difficulties it sees in doing the job, its plans and expectations, and what it knows about its competitors, the plans and expectations of the customer, the economy, and the future.

Using these considerations, management may decide what to offer and instruct its negotiators on the minimum they can agree to. The result is the product of judgment in which estimated cost is vital but not dominant. The proposal is good, in their judgment, because it is calculated to get them the contract with risks held within acceptable tolerances.

The basic estimate will have told management what it is likely to cost and helped management establish a maximum figure within which the company must work to develop, test, and produce the item. The final estimate will be a gross figure because of the uncertainties in estimating the cost of developing a new product, and the details of material and labor will undoubtedly change as specific dimensions, weight, and technical characteristics are defined in the development process. Thus, the separate elements of the estimate may not be as significant as the total figure in evaluating the offer.

In another situation, when a company manufactures and sells a line or family of similar products like gyroscopes, electron tubes, or forgings and castings, its price may be cost-based, but the costs may not be estimated and accounted for contract by contract. If production efforts are planned and managed by product line or process, the costs may be accumulated in that fashion and prices established on a basis appropriate to that situation. Prices probably will be based on average costs for a given quantity.

You need to take a different approach to evaluating the costs that support a proposal developed on this basis. Assumptions concerning the projected number of units that will be sold, the production rate, and the tooling associated with that rate are some of the factors that will need to be considered.

If the contractor does a relatively large volume of business with the Government, audit and contract administration personnel should have made a detailed review of estimating methods and procedures. Information from these reviews should help in cost analysis, because the reviews cover the contractor's methods for preparing prospective price proposals. If the review report doesn't describe the methods, the contractor's written estimating procedures may. [Even if an offeror doesn't have a formal estimating system, detailed instructions on using the SF 1411 (FAR Table 15-2) tell the offeror to explain the pricing of each element of a proposal. You may need to remind offerors of this in the solicitation.]

You should know how the contractor develops the estimate of each specific cost element, how experience, cost records, statistical data, current conditions, and judgment are used in estimating. You should be sure there is a timely interchange of data between, for example, the purchasing and estimating activities. You should know as much as you can about where, by whom, and to what depth proposals and supporting cost estimates are reviewed in the company.

To summarize, you need to understand the estimating methods and procedures of companies with which you do business regularly. This understanding should be based on your review of pricing proposals submitted by the offeror and on the latest report of estimating methods. You should be familiar with the written procedures, the way the company's system actually works when it deviates in any way from written procedures, the tools and techniques of the company's estimators, and its record in producing realistic estimates. If there are not written procedures, make sure the proposal includes explanations of how the costs were estimated.

Different companies necessarily prepare their estimates in different ways, and the same company may use different methods to prepare different types of proposals. Three common methods of estimating are round-table, comparison, and detailed.

Round-table estimating

Representatives of departments such as engineering, manufacturing, contracts, purchasing, and accounting may be brought together to develop the costs on the basis of experience, knowledge of product, and knowledge of market conditions. The estimate is usually completed without benefit of detailed drawings or bills of materials and with very limited information concerning specifications. Standard costs are usually available for a large percentage of the parts. This type of estimating has the advantage of speed of application and is relatively inexpensive.

Estimating by comparison

This usually involves the estimator and representatives of the departments concerned in the proposed effort. Parts or processes comparable to those required for the task being estimated are selected. The known costs of these similar parts or processes are adjusted by adding or subtracting elements of material and time as determined necessary for the new task. This method often is used when the requirements for the new product are very similar to those of a past or current product and when relatively few adjustments need to be made in estimating.

Detailed estimating

This method is characterized by a thorough, detailed analysis of all components, processes, and assemblies. Requirements for labor, tooling, material, and additional capital items are produced by this type of estimating. The application of labor rates, material prices, and overhead to the calculated requirements translates the estimate into dollars. This type of estimating is further characterized by the presence of complete calculations, records, and quotations that are available for future use.

To perform detailed estimating, each component is separated into parts, operations, and cost elements. Some of the elements of data used are drawings, bills of materials, specifications, production quantities, production rates, analysis of manufacturing processes, tooling and capital costs, machine and work station workloads, plant layout, labor, raw materials and purchased parts, overhead, special tools and dies, and manufacturing, engineering, and tooling labor and such factors as labor efficiency, labor learning, setup, rework, and material scrap, waste, and spoilage.

It might cost more to establish the capability for detailed estimating, but it is not necessarily more expensive to do. Once established, the system can be operated by specialized administrative personnel. If the volume of estimates is great, detailed estimating may be less costly than the round-table method, which often uses highly paid department or division heads as the estimators.

In most major companies, a cost estimating group puts the final pricing proposal together. The group may be under the financial vice president or the controller. If there is a project control organization, the cost estimating group may be there.

The cost estimators usually rely on personnel in (1) engineering and manufacturing for estimates of direct labor hours and special tooling costs; (2) purchasing for estimates of material and subcontract costs; (3) project offices for estimates of direct travel and project direct labor hours; (4) drafting or data control for estimates of costs of data items; and (5) facility engineering for estimates of any facility costs. The cost estimators get average labor rates by class of employee from payroll records, overhead rates from accounting, facility capital cost of money rates from facility records, and inflation assumptions and profit rates from management. With these data, the group develops a proposal.

In other companies, all prime costs are estimated by the groups that will incur the costs and are then forwarded to the estimating group to be consolidated with like costs from other parts of the organization and multiplied by the factor and rate applications. You can check the estimating procedure at each source for realism and check the results by observing the budget control of the estimate to see whether the control generates maximum effectiveness and whether the actual costs approximate the estimate.

In this environment, each operating group establishes its own budget. Therefore, there must be close management control of the budget to ensure effective operation. Otherwise, seemingly good performance against budget may only mean that the budget was high to begin with. One thing to find out is whether the total dollars in the estimate become the budget or whether management withholds a percentage of the estimate for control.

Other companies will use some combination of these divergent approaches to detailed estimating. It obviously is important to understand how a specific estimating method functions before beginning any evaluation.

In most companies, the cost estimate is reviewed by management before it is released to sales and used to support a proposal. The objectives of this review are to obtain commitments from the operating groups to operate within the estimate, to apply profit objectives, and to determine the attractiveness of the proposal, considering competition, past prices, how much the buying activity has to spend, the corporate image, and similar factors. Cost estimates may be changed by management decisions such as :

a. "This will be a cost-reimbursement contract. The agency has this project budgeted at $500,000. Although the estimate says it can take $650,000 to do the job, maybe we can do it for less. Let's change our estimate to $490,000."

b. "Cervay and Davies will both be bidding low, trying to take this business from us. They'll have to spend about $25,000 on tooling they don't have for this job. We've been selling this at $200 a copy. If we drop the price to $190 for this buy, Cervay and Davies shouldn't be able to touch us."

c. "This estimate says we can do this job for $375 and will make 15 percent, but we had to strain to make 5 percent on a similar job last year. Our proposal will have to be at least $415."

Prime costs will be estimated, regardless of the system, using historical cost data on the same or similar items, standard cost data on the same or similar items, or the judgment of qualified technicians. The estimate may be a combination of all three.

In evaluating the manner in which this is done, remember that you are trying to determine what costs should be at some period in the future. This implies some way of projecting current experience into a future period. For greatest validity, the costs used must include the latest actual, recorded costs. Further, it is not enough to use the costs of one period as the estimate for another without making some adjustments. This also is true if standards are involved; the offeror may be expected to adjust standards, or variances, or both, for a future production environment. The manner in which these adjustments are made is the major judgment area in the cost estimate.

The various factors applied to the prime cost will be either labor-rate applications to labor hours or indirect-expense applications to both labor and material costs. Both require detailed analysis by the estimator to establish the conditions that may exist when the prime costs are incurred.

Labor-rate analysis should involve projections of the local or regional economic trends as well as the national trend. These data will develop the underlying trend affecting labor as a whole. The mix of labor in the specific company is the other parameter. The analysis needs to reflect the growth or decline in the labor force during the period of production and how the mix of labor may change either plantwide or by category, whichever rate is being projected. Rate charts portraying the actual labor rate by month and either the head count or manhours by month over past periods are helpful.

Overhead factors will vary from allocations of fixed costs on some logical basis to allocations of variable costs on specific base costs. Charts plotting the actuals and the related base costs are usually the best and easiest means of evaluation; they also provide a tool for projection. These costs are so interrelated with prime costs that they must be evaluated together. Indirect labor, for example, is a major part of most factory and engineering overhead pools. Plottings of indirect/direct labor ratios are most helpful in evaluating the realism of indirect labor in a future period.

The estimating group applies most of these rates and factors to the prime cost mechanically, although some estimating groups will monitor the realism of the rates and factors. As a rule, these rates and factors will be applied by direction received in rate letters either from management or, through management, from the department concerned. The evaluation, therefore, is usually focused in the cost centers if they have adequate records or in the accounting system itself. Because these costs usually result in budget items, both management and the operating groups are actively interested.

Companies may rely on consultants to prepare or help prepare proposals. If a company is new to Government contracting, the consultant may need to conceptualize an adequate cost accounting system before preparing a proposal. You need assurances, in such a case, that the company will implement the conceptualized system if it is awarded the contract.

3.8 Sources of Cost or Pricing Data

The offeror or contractor is the primary source of the cost or pricing data needed to do a cost analysis. You will have to decide how much is enough when you ask for cost or pricing data. The offeror will aid your decision in at least two ways. The first starts with the cost or pricing data submitted with the proposal. These data may be enough, but there also may be other data that you need and will request even if the offeror didn't use them in preparing the proposal. What you ask for will depend on your experience and your judgment; there is no way to tell you what it will be in every case.

The other way the offeror may help you is by questioning or otherwise resisting your request. If questioned, remember that it can be costly to prepare data that are not available in the form you have requested. The data that are available may do the job. The offeror is almost sure to resist if you ask for irrelevant information or impose a burdensome requirement. If the offeror resists a legitimate request, you'll need to sort out the facts and persist in your search. In either case, you must rely on your judgment in requesting data and in deciding when you have enough.

You, the contracting officer, must decide whether the proposal is supported by cost or pricing data complete to the time of submission. You must review the company's submission and decide whether analysis should start. If the submission is complete, you should give the auditor and others the go-ahead. If not, you must do what is necessary to get the company to make it complete, and you must look to the company and not to Government personnel for this.

In requesting information, have specific reasons for the request and be able to show the company how the data will help both of you. Companies have reasonably certain knowledge of what information can be of value, and you can expect resistance if your request goes beyond that point. You should recognize the likelihood that an offeror will be more thorough and use more kinds of data in preparing a proposal in the million-dollar class than for one around $100,000. Estimating practices may be more complicated, too, and this has a bearing on the kind and volume of data used and available.

When you have frequent negotiations with the company, you should take time to tailor the format in which the company will submit its supporting information. You should review the types of information available within the company, the statistical and accounting reports already prepared for internal use, and agree on what sorts of standard or semistandard information will be furnished with what sorts of proposals. This arrangement should be reviewed continually and refined as necessary. You probably will work with audit and administrative personnel in putting together an agreement, and it would make sense to include representatives from all buying offices doing significant business with the company.

Don't forget that some data items are significant only at cutoff or closing dates. These should be identified in the Defense Contract Audit Agency (DCAA) report on the company's estimating methods. Consider these before you reach any agreement on data to be furnished. For example, monthly burden rates may not be available before the 20th of the following month. This lag may be caused by the time it takes to process accounting records and make the required internal checks. Because the contractor is obliged to keep you current on cost or pricing data until agreement is reached on price, you may want to specify and agree upon specific cutoff (as-of) dates.

Submission of cost or pricing data and certification as to their completeness, accuracy, and currency are required when the procurement is noncompetitive and the value of the transaction is $100,000 or more. Both also are required for modifications to existing contracts as well as for negotiation of new ones, and that also includes redetermination of prices and termination settlements. Interim and final adjustments of contract prices under an incentive clause are price redeterminations.

3.9 Estimating Techniques and Tools for Quantitative Measurements

This section introduces tools and techniques and defines and discusses them, but it does not cover them in the depth necessary for effective use. You must read the literature of this field and take formal courses if you are to acquire the skills and the confidence to use them.

Descriptive statistics

Descriptive statistics are those that summarize a set of data. They include measures of central tendency, measures of variability, indexes, and correlation methods.

Descriptive statistics have played a useful role in pricing for a number of years. The use of average labor rates for a particular labor classification, department, shop, or plant is well-established. There is much more to the subject than averages, however, and this will be discussed here.

In general, descriptive statistics perform two basic functions: to describe large quantities of data in simple terms and to describe data changes that occur over time.

Measures of Central Tendency

Most of us are familar with average wage rates, an average worker, or usual rate of profit. These examples involve measures of central tendency that should be distinguished from each other. No single measure can be used indiscriminately.

The three most common measures are the arithmetic mean, the median, and the mode. The first is determined by calculation, the second by its position in an array, and the third by finding the point about which values of the variable cluster most closely.

The most common measure is the arithmetic mean or, more simply, the mean. When used alone, the term "average" usually refers to the mean. The mean of any series of values is found by adding all the values and dividing their sum by the number of values. The mean is an artificial concept because it may not coincide with any actual value. For example, the mean number of children in a group of families may be 2.7. The mean is determined by the value of every item and is greatly affected by extreme values. The mean can be computed from original data without forming an array or frequency distribution. Because the mean is determined by a rigid formula, it lends itself to subsequent algebraic treatment better than other averages.

The median is the middle value in order of size for an odd number of items, or the average of the two middle values for an even number of items. The median:

a. Is a simple concept, easy to understand and compute.

b. Is not affected by the value of extreme items (therefore, it is widely used when the mean would be distorted by extreme values, such as in measurements of annual income, where a millionaire in the group might seriously distort the mean).

c. May be unreliable if there is no clustering of data.

The mode is defined as the value that occurs most often, or the value around which there is the greatest degree of clustering. The mode:

a. Is computed from a frequency distribution.

b. Is not affected by either the number of items or the extreme values.

c. May be erratic if there are only a few values available or if there is more than one modal value.

The answer to the question of which measure to use depends on the following:

a. The concept of typical (or average) value required by the problem. Is it a composite average of all absolute values or relatives (arithmetic or geometric mean); is it a middle value (median); or is it the most common value (mode)?

b. The distribution of available data. Is it badly skewed? (Avoid the mean.) Does it have a gap in the middle? (Avoid the median.) Does it lack a major point of concentration? (Avoid the mode.) In many cases, the mean, median, and mode are quite similar. In a normal distribution, which underlies many statistical methods, the mean, median, and mode are the same.

There are other, more sophisticated measures of the mean, such as the geometric mean and the harmonic mean, but they are beyond the scope of this section.

Measures of Variability

It is not enough to know the central value of a distribution. Usually, the mean is used with some measure of variability to describe a set of data. Measures of variability describe how widely dispersed the set of values is relative to the mean. The variability in a distribution is used to set confidence limits defining the reliability of the statistics.

The most frequently used measures of dispersion include the range, the variance, and the standard deviation.

The range is the simplest measure of dispersion. It is the difference between the largest and smallest values. Sometimes the range is indicated by citing the largest and smallest figures. Quotations of commodity prices typically include the high and low for the day. The range:

a. Is easy to compute and understand.

b. Is often misleading, because it is based on two extreme values only.

c. Does not indicate the dispersion of intervening values.

The variance is the sum of the squared deviations from the mean, divided by the number of values in the distribution. The variance:

a. Takes every item into account.

b. Is affected by extreme values.

c Is important in other statistical methods such as regression.

The standard deviation is the square root of the variance. The standard deviation is of such importance that it is the "standard" measure of dispersion. The standard deviation:

a. Is more useful and better adapted to further analysis than other measures of dispersion.

b. Is the most widely used measure of dispersion and the easiest to handle algebraically.

c. Is harder to compute and more difficult to understand, and is greatly affected by extreme values.

One important use of the standard deviation is to compute "standard" or "normalized" values. The computation is based on the assumption that the values in the data set follow a normal distribution. The normal distribution is often referred to as a bell curve because of the shape of the distribution. Most statistical tests of significance require the assumption that data values are distributed normally. Data are often converted into standard values to make them easier to work with.

To compute standard values, subtract the mean value from each value in the distribution and divide each by the standard deviation of the distribution. A standard or normalized value will tell how many standard deviatons from the mean each value is. Because of the statistical properties of the normal distribution, you can make certain types of probability statements about the data.

For instance, 68 percent of the values of a normal distribution are within plus or minus one standard deviation of the mean. If you know that the average worker takes two hours to complete a task with a standard deviation of one-half hour, then 68 percent of the people doing this task will do it in one-and-a-half to two-and-a-half hours. Furthermore, 95.5 percent of the values will be within two standard deviations, and 99.7 percent will be within three standard deviations.

Another descriptive statistic, not used frequently, is the index of skewness. This statistic is calculated in the same way as the variance, except that the deviations from the mean are cubed instead of squared. Skewness refers to the symmetry of a distribution. The normal distribution is symmetrical. The reliability of the statistics will be affected if the distribution of data values is heavily skewed to one side or the other.

The measures of dispersion are expressed in original units, such as dollars. These values may be used to compare variation when units are the same. When units are not the same, a measure of relative dispersion may be used. The most frequently used measure of relative dispersion is the coefficient of variation, which is the ratio of the standard deviation to the mean.

Suppose you want to compare the use of direct labor in Departments A and B. Department A reports that the average weekly wage is $400, with a standard deviation of $10, and Department B reports an average work week of 40 hours, with a standard deviation of 1.6 hours. You summarize the data as shown in Table 3-1.

TABLE 3-1

	MEAN	STANDARD DEVIATION
Department A	$400	$10
Department B	40 hours	1.6 hours

Department A has a much larger standard deviation in absolute numerical terms. You need a way to make a relative comparison of wages to hours.

The coefficient of variation is 10/400 = 2.5 percent for Department A and 1.6/40 = 4 percent for Department B. Although Department A appears to have more variability, when a relative measure is used, Department B is seen to have the greater variability. The coefficient of variation enables you to compare the labor dollars to labor hours in a meaningful way.

In summary, measures of dispersion help describe data and provide a basis for comparing relative dispersion. In addition, the standard deviation can be related to standard statistical distributions and the normal distribution. It is used in studies of reliability, in quality control, in sampling, and in other applications of statistical methods.

Indices

The changing value of the dollar is a problem. Index numbers, particularly price index numbers, give you a tool to treat the effect on price of the changing value of the dollar. Index numbers usually indicate historical price changes with respect to time; these can be used to analyze, compare, or predict costs or prices in different periods.

Index numbers are used instead of prices for a number of reasons. One is to compare price changes for aggregates of different items, such as aggregative price changes for apples and oranges or plywood and nails. Another reason is to aggregate samples of price changes for different items and use the aggregated sample to represent price changes for an entire population of items.

You can use index numbers to deflate or inflate prices for comparisons, to project price or cost escalation in contract documents, and to inflate or deflate costs to facilitate analysis. Index numbers are used in price analysis to compare the proposed price of an item with the price of the same or a similar item procured previously. Here, the index numbers are used to discount any inflation that has occurred over time, so the comparison can be made in constant dollars.

Economic price adjustment clauses may require action to adjust the price paid to reflect actual price levels at the time of contract performance. These clauses use index numbers to measure the change in price levels. Index numbers also can facilitate analysis of individual cost elements by eliminating or reducing the effects of inflation. The analysis can then be performed in constant dollars.

Index numbers are ratios indicating change in values, quantities, or prices. The ratios are derived by comparing each item with the corresponding figure from a commodity or a group of similar commodities such as plywood, steel, or grain. More commonly, index numbers are aggregates of a number of different commodities, products, or services. Each item in the aggregation may be weighted to represent a commodity, product, or service in proportion to its amount in a particular end item, industry, or geographical region.

Index numbers are commonly of three distinct types: price, quantity, or value. Price index numbers represent changes in prices of items, commodities, or services over time. An example of a price index number is the "Wholesale Price Index" (Bureau of Labor Statistics), which represents the change, over time, in the average wholesale prices of commodities and products sold in the United States.

A quantity index measures the change in the amount of a commodity or product output over periods of time. The Federal Reserve Board compiles a quantity index called the "Index of Industrial Production," which measures the physical volume of factory production in the United States from one year to the next.

A value index combines changes in both prices and quantity over time. Value indexes can be considered the product of a price index and a quantity index. A commonly used value index is the "Index of Retail Sales" published in the Federal Reserve Bulletin; it reflects the changes in both price and quantity of the items sold by retail outlets across the United States. When you use index numbers, identify the type of index number you are working with and use that type throughout the analysis.

Price index numbers, as mentioned above, indicate price changes with respect to time for some specific commodity, product, or service. They relate prices paid in one period to prices paid in another period. To provide comparability, a series of index numbers representing some commodity, product, or service is always constructed using the same base period, thus reflecting a percentage increase or decrease in prices relative to that base period.

To select a base period, it is best to choose a year in which prices are not changing erratically, but this may be difficult when hundreds of items are included in an aggregative index number. As a result, on a short series of data, say five to 10 years, the first or earliest year often is made the base year.

The U.S. Department of Labor's Bureau of Labor Statistics (BLS) plans to change its base year about every five years.

A shift in a series of index numbers to a new base year is a straightforward calculation if it is known that the original sample of goods and services remains representative of the price changes to be indicated. The shift can be accomplished by dividing each number in a series by the index number for the year to be used as the new base. Table 3-2 illustrates the shift of the base year from 1975 to 1977. The conversion was done by dividing each number in the first series by 108.2 and multiplying by 100.

TABLE 3-2

	1970	1975	1977	1981
Base year = 1975	89.4	100.0	108.2	123.0
Base year = 1977	82.6	92.4	100.0	113.7

The revised index number series relates the same information as the initial series. Only the base year has been changed. Many organizations follow the lead of the BLS when choosing a base year for indexes.

A simple price index series is usually a time series of price relatives of individual commodities converted to percentages. In this case, a price relative is the average price of an item for a given period (e.g., a year), divided by the average price of an item for the base period.

When constructing price index numbers, express price in dollars per measure of quantity. These measures of quantity are used in constructing weighting factors for weighted aggregative numbers. Don't express the price in terms of dollars per period, as in accounting data. Accounting data need to be converted to dollars per measure of quantity before they can be used in constructing price index numbers.

A single simple index number seldom suffices for pricing purposes. Most purchased items are made up of many different materials and types of labor, the prices of which vary at different rates as time passes. Therefore, you must contruct composite index numbers that reflect aggregative changes in the prices of the components, assemblies, and labor that make up an item. This need is met by a number of different methods for constructing aggregative indexes.

Often you will not have enough data or time to construct index numbers. Many previously constructed general price index numbers exist that may be used to approximate price changes of a particular product or service. Probably the best known and most frequently used sources of price index numbers are the "Wholesale Prices and Price Indexes" published monthly by the BLS. The BLS publication, "Monthly Labor Review," is the place to find these economic indicators.

The wholesale price indexes are a series of indexes for prices of specific commodities and products. Each series is successively aggregated into homogeneous categories of items and commodities and then into a general aggregation of wholesale prices for all production in the United States. Accordingly, you can choose among indexes for many different levels of aggregation to locate an index that fits a specific product.

Another source of price index numbers is the Survey of Current Business, published monthly by the U.S. Department of Commerce, Bureau of Economic Analysis. The Bureau of Economic Analysis publishes a yearly supplement to the Survey of Current Business; it gives definitions and historical numbers for the indices used in the Survey.

A useful source of data for constructing labor price index numbers is the BLS periodical "Employment and Earnings," which sets forth average wage rates segregated by skill and geographical categories. These rates can be used to tailor an index to fit a specific product or company. The annual "National Survey of Professional Administrative, Technical and Clerical Pay," a BLS publication, provides useful data on indirect labor pay rate changes.

The "Economic Report of the President," an annual publication, sets forth extensive summaries of economic indicators and accordingly is helpful in evaluating long-range trends indate.

A general index series must be used cautiously, because it usually does not exactly fit the cost pattern of the product or service being analyzed. Possibilities for error lie in the facts that (1) the data are usually national or regional averages and not those of a specific contractor and (2) the sample of items making up an index probably will not fit a specific product or contractor effort. Nevertheless, previously constructed index numbers are practical alternatives to building index number series from basic cost data.

So far, discussion has centered upon index numbers as a measure of history. The specially constructed or previously constructed price index numbers indicate changes of prices in times past. Contract pricing is concerned with predicting or forecasting prices in the future. Accordingly, you also must be able to forecast prices.

The best forecasts of future prices are made by professionals in the field. Their predictions generally are based on models of the U.S. economy that take into account factors influencing wages and prices. However, authoritative predictions applicable to specific commodities and localities may not be available. In these cases, trend analysis may be used. If trend analysis is used, a curved model of some form (e.g., an exponential or parabolic model) may give better results than a straight line.

For short-range forecasting (less than two years), simple models like the straight line are reasonably accurate. It makes good sense in short-range forecasting to put more weight on data from the most recent years. You can do this by ignoring the early years of data, graphically fitting a straight line through recent data, and extending that straight line into future years for the forecast. A more objective approach to short-term forecasting is through exponential smoothing, a mathematical method giving extra weight to more recent data.

Probably the most important single rule about forecasting is that no one can predict an economic turning point. Thus, the concept of using the most recent data for short-range forecasts and using the trend for long-range forecasts is proper if there are no policy or control aspects to be considered in the forecast.

After obtaining or constructing a price index series, you may use these numbers in cost or price analyses to inflate or deflate prices for comparative analysis or to project cost or price escalation in pricing arrangements.

One common use of price index numbers is to measure inflation. One can define price inflation as the increase in price of an item or service of constant quality and quantity. Price index numbers can be used to compare the prices of the same or similar items purchased at different times by inflating the old purchase price to a current period or deflating a current price to some earlier period.

Some contracts provide for price adjustment in the event of significant unanticipated fluctuations in the economy, one of the elements of cost risk in a contract. This risk can be shifted partly or totally to the Government by using a price adjustment clause.

Probability

Probability is a useful concept, particularly in prospective pricing. The evaluation and extrapolation of trends and information obtained from samples requires knowledge of probability. Any discussion of future events based on a sample is fraught with uncertainty and risks. Probability concepts can be used to quantify uncertainty, and actions can be taken to minimize or compensate for uncertainty.

A probability is a number between 0 and 1, inclusive, representing the chance or likelihood that an event will occur. A probability of 0 means the event is impossible, while a probability of 1 means that the event is certain. A probability may also be stated as a percentage, such as "there is a 50 percent chance of this happening," which implies that, given a sufficient number of possibilities for the event to occur, it will occur, on the average, 50 percent of the time.

A probability also may be stated as an odds ratio. For example, the statement "there is a 3 to 2 chance of this occurring" means that the probability is 3/5, or 60 percent. A probability statement should not be interpreted to mean that an event will occur exactly in the stated proportion or percentage of times. The concept of probability (1) assumes an average over a long series of opportunities for the event to occur and (2) assumes that each event occurs independently of all the others.

You must be careful in interpreting probabilities when you refer to a particular occurrence of an event. For example, the statement "there is a 25 percent chance of contractor X having technical difficulties" implies that, over the long run, contractor X will have technical difficulties on one-fourth of its contracts. It does not mean that the contractor will have technical difficulties on 25 percent of a particular contract because either there will be technical difficulties on that contract or there won't.

You also must distinguish between past and future. When a contract is completed, either the contractor will have experienced technical difficulties or it will not have, as discussed above. The past is fact; probabilities don't apply.

There are three basic sources of probabilities. The first is the relative frequency of past events. Virtually every historical percentage applied to a forward pricing situation can be construed as a probability statement. For example, the statement "sustaining engineering has traditionally been 10 percent of the total hours and is therefore estimated as such" implies that there is a .1, or 10 percent, probability that a future hour spent on the effort will be a sustaining engineering hour.

A second source of probabilities is theoretical probability distributions such as the normal distribution. Many standard statistical procedures such as sampling and regression analysis are based on an underlying assumption of some theoretical probability distribution. Many distributions are tabulated and can be found in virtually any statistical text. Most statistical procedures are designed to use these theoretical probabilities, and results will contain probability statements based on a theoretical probability distribution.

Judgment is a third source of probabilities. Subjective probabilities are no more than an individual evaluation of the "likelihood" of unknown events. Because subjective probability is personal to an individual, two people may attach different probabilities to the same event. Even so, these probabilities may be used in the same manner as more objective probabilities.

Use of probabilities in cost and price analyses usually will involve either projection of relative frequencies into future periods, or certain theoretical distributions in standard statistical procedures. In evaluating the relative frequency approach, ask yourself: Is the process stable; that is, is the relative frequency converging to some number or is it trending up or down? The answer will let you make a more rational judgment about cost projections.

Sampling

In general, sampling is used to obtain statistics from a large body of data without resorting to a complete census. We know that it takes time and effort to evaluate a cost estimate. Bills of materials may contain hundreds or even thousands of items. To evaluate each and every item would involve manpower that could be applied more productively to other parts of the proposal. Auditors have used sampling for years, and sampling is a well- established practice in quality control.

There are two broad methods of selecting samples: probability sampling and nonprobability sampling. Within each are a number of different sampling techniques. Probability sampling is based on random sampling, in which each item in the data has a known chance of being chosen. In probability samples, you can estimate the precision of the sample results or compare the precision of different types of samples.

Simple random sampling is the most common way of sampling. Each element in a population has an equal chance of being selected to be in the sample. The sample may be drawn with or without replacement, and there are formulas for calculating unbiased estimates of population statistics such as the mean and standard deviation for either alternative. The usual procedure is to assign sequential numbers to all items in the population and use a table of random numbers or a set of random numbers generated by a computer to identify the item numbers to be included in the sample.

Stratified sampling is used if a population can be divided into subpopulations that are distinctive in the aspect being sampled. The population is divided into strata, the elements of which are more nearly alike than the elements of the whole population. Then, an assigned part of the sample is drawn from each of the strata by simple random selection.

This technique often is used if there are significant dollar differences in items on a bill of materials. The bill of materials is divided into different categories such as high-, medium-, and low-value items, and a sample is drawn from each of the categories. In some cases, different proportions of the strata would be sampled, such as 100 percent of the high-value, 50 percent of the medium- value, and 10 percent of the low-value items.

Cluster sampling is a procedure by which a population is divided into several groups of clusters. A number of these clusters are drawn into the sample. If a subsample of elements is selected from the specified clusters, the procedure is known as "two-stage sampling" or "cluster sampling with subsampling."

An example would be a bill of materials in work breakdown structure format. There might be 10 assemblies at the major assembly level. Three of these are selected at random, and a simple random or stratified sample is drawn from the selected major assemblies. Cluster sampling is relatively inefficient, because its results are not usually as precise as the results of other methods for a sample of the same size. This drawback can be overcome by increasing the size of the sample.

Nonprobability sampling is any method of sampling that does not satisfy all the requirements of a probability sampling approach. This may involve selection of a sample according to personal convenience or expert judgment, or selection under conditions in which no complete list is available for objective selection.

Systematic sampling, the selection of every kth item (say every 25th), is an example of nonprobability sampling. A systematic sample can become a random sample if the starting point is chosen at random; instead of starting with Item 1, pick the starting item randomly from the first k items. This fulfills the random sampling criterion that each item have an equal chance of being chosen.

The main difference between probability and nonprobability sampling is the precision with which population statistics can be estimated. In general, the precision of a probability sample can be calculated by applying various formulas and even improved by simply taking a larger sample.

The precision of a nonprobability sampling cannot be calculated and there is no guarantee that a larger sample will yield more precise information. Nevertheless, nonprobability sampling may be desirable for samples that are too small for the advantages of more objective methods, for pilot studies, and for the selection of components of index numbers. Probability sampling, however, is necessary to obtain a high degree of reliability in most large samples.

Hypothesis testing

A statistical hypothesis is a statement about a population. Examples: less than 10 percent of the parts in the latest shipment will be defective; or, engineering labor has the highest cost. A test of a hypothesis is a procedure to try to determine whether a hypothesis is true or false. If you took a census of the population, you could state with certainty that the hypothesis is either true or false.

Often you must work with a sample, and in that case you can only say that the hypothesis is probably true or probably false.

Most statistical tests examine a parameter of the data distribution. The mean and the standard deviation are the population parameters commonly tested. The t-statistic and the F-statistic are examples. Some statistical tests are concerned with the shape of the distribution instead of the parameters. The chi-square (x^2) test is an example of this type. You may wish to test a hypothesis about the difference between means for two samples. You might be asking questions such as:

a. Is there a difference between the wages of men and women at a particular plant?

b. Is there a difference between the cost of tooling requirements for subsonic versus supersonic aircraft?

After you calculate the t-statistic, you consult a standard table to determine whether the t-value from your samples is significant. The t-statistic is also used to test the significance of the individual coefficients in regression analysis.

The F-statistic is similar in concept to the t-statistic except that it tests differences between variances. For example, a manufacturer that has to meet rigid specifications will test the variability in its product. The F-statistic is used to test the significance of a regression as a whole.

The chi-square statistic, sometimes referred to as a measure of "goodness of fit," tests the shape of a distribution instead of testing a parameter. It can be used on data that are in category form. The data you have may also be stated as frequencies or proportions. The x^2 statistic tests whether the obtained frequencies are significantly different from the frequencies expected under a certain set of assumptions. The value of the x^2 computed is compared to the values in a standard table to determine the significance.

The most common forms of analysis used today are correlation and regression analysis. Both correlation and regression are concerned with the relationship between two variables. You might be asking the following types of questions:

a. Is there a relationship between absenteeism and productivity?

b. Is there a relationship between cost growth and contract type?

c. What is the role of facilities capital in determining contract profit rates?

The correlation coefficient varies between −1 and +1. A correlation coefficient of 0 means that the two variables do not have any relationship. A positive correlation coefficient means that the variables move in the same direction; if one variable is increasing, the correlated variable will tend to increase also. A negative value means that the variables move inversely to each other. Referring to the questionsabove, you might find a negative correlation between absenteeism and productivity.

The basic tool for establishing a quantitative relationship between two or more variables is *regression analysis*, which involves finding the coefficients (constants) of a specified equation so that the sum of the squares of the deviations from that equation are minimized. Most regression analysis will be linear regression, which means that the equation being tested is a straight line. There are also techniques for doing curvilinear regressions, where the equation being considered has at least one variable raised to a power.

Simple linear regression involves relating two variables (x and y) by a straight-line equation:

$$y = a + bx$$

The equation is a statement of the hypothesis you are testing. The dependent variable is called y, and the independent variable is x.

The regression analysis provides numeric values of the constants a and b, measures of the strength of the relationship between the two variables (such as the correlation coefficient), and provides statistics that indicate whether the relationship is significant in a statistical sense. The equation itself can be used to make projections of the variable y, given values of the variable x. Other statistics can be used to develop interval estimates based on selected levels of probability for those projections.

Multiple linear regression is similar to simple linear regression, with the exception that there is more than one driving, or independent, variable.For example, the equation:

$$y = a + b_1x_1 + b_2x_2$$

depicts a relationship in which the variable y is determined by not one, but two variables, x_1 and x_2.

An example of the application of this relationship is the classic skill mix problem in the analysis of labor rates where:

y = labor rate
x_1 = time period
x_2 = number of employees.

An equation of this kind would allow you to adjust your rate projections not only for the effect of increases over time but also for changes in the size of the workforce.

A number of computer programs perform the calculations involved in applying any of these statistical tools. If you are considering one of these procedures, consult an appropriate text for a more detailed explanation. Match that explanation with the documentation for the computer program you are using to ensure that you fully understand the tool and the result.

Many of these statistical programs are available for personal computers, as are spreadsheet programs that allow you to organize your data, perform calculations, and produce graphic representations of the results. These programs are easy to learn and may be easier to use for simple statistical analysis.

Forecasting

Forecasting is a projection over time. Examples are a projection of a labor rate or a price index number. The many approaches to forecasting range from the totally subjective to the totally mathematical.

The classical model of time series analysis treats time as the driving variable and attempts to measure changes that occur in the data over time by considering (1) secular trends, (2) cyclical variations, (3) seasonal variations, and (4) residual fluctuations.

The *secular trend* is an identifiable movement occurring over a long period of time, usually 25 years or more.

Cyclical variations are periodic movements with a period of from two to as many as 15 or 20 years. Many series of labor rates, for example, have strong cyclic components, the period of which coincides with the length of union contracts in that industry.

Seasonal variations are those variations in time series data that result from natural forces such as the seasons themselves or from manmade conventions such as the different numbers of workdays in a particular month. These factors make month-to-month comparisons of economic data misleading unless the data are seasonally adjusted.

The *residual fluctuations* in time series are caused by such factors as unusual weather, labor strife, war, Government intervention, and all other forms of unpredictable events.

The need for time series projections occurs often. The techniques used depend to some extent on the periods for which the projection is needed and the degree of accuracy required. In any analysis of time series, you should delete from the data the effect of any events that will occur again and whose magnitude you can determine from other sources. For example, if you are working with a series of labor rates, you should edit the series to remove step and cost-of-living increases (if you have projections of these factors available from union agreements or other sources), and you should analyze the residual variation in the data.

Most time series projections attempt to project only the secular trend of edited data, ignoring seasonal, cyclical, or irregular effects. A projection of the secular trend is necessary for any time series analysis, but you should recognize that a trend projection by itself is subject to considerable variation from reality if strong cyclical, seasonal, or irregular effects have been ignored.

Methods used for trend projections range from freehand extrapolation to sophisticated mathematical models. Linear or curvilinear regression analyses are recommended for projections beyond two years. For short-term projections, regression analysis may prove inadequate because of cyclical effects. A technique called exponential smoothing may be used for short-term trend projections. This technique considers various weights for the most recent data and produces a different projection equation at each period. This contrasts with regression analysis, which uses a single equation to describe the whole series of data.

Cyclical effects are the most difficult to analyze and thus are usually ignored in all but the most sophisticated analyses. A technique called spectral analysis has been useful for measuring the length and intensity of cycles, but it is difficult to use in making projections.

Seasonal effects should be considered in working with any data that are representative of a period shorter than a year: quarterly, monthly, or weekly data, for example. In some cases, it may be necessary to adjust annual data. Seasonal effects usually are analyzed by developing a series of index numbers that can be used to eliminate seasonal variations in data.

Another method of seasonally adjusting data is to use a *moving average* when the periods averaged correspond to the number of seasons. For example, a four-quarter moving average would adjust quarterly data seasonally, as shown in Table 3-3.

TABLE 3-3

YEAR	QUARTER	UNADJUSTED DATA	FOUR-QUARTER MOVING AVERAGE
19X1	1	36	–
	2	44	–
	3	45	–
	4	106	57.75
19X2	1	38	58.25
	2	46	58.75
	3	47	59.25
	4	112	60.75

Note how the moving average smooths out the severe seasonal swing. It is easier to develop a trend from the moving average than from the unadjusted data.

First, a moving average should be used to smooth data. After smoothing, the data can be used to develop trends. But remember, there is great danger that a moving average will be identified as the trend and used as a basis for establishing prices. The danger is illustrated in Table 3-4 by the example of a moving average called the cumulative average.

TABLE 3-4

UNIT NO.	ACTUAL HOURS	CUMULATIVE AVERAGE HOURS
1	100	100.0
2	95	97.5
3	90	95.0
4	85	92.5
5	80	90.0

There are four approaches to estimating the cost of unit 6 on the basis of these data (Table 3-5).

TABLE 3-5

	HOURS
Last actual	80
Trend from actuals	75
Cumulative average to last actual	90
Trend from cumulative average	87.5

A cumulative average will tend to obscure the effect of a trend in data. Therefore, any type of moving average should be evaluated before it is used as a basis for pricing.

Residual variations must be considered case-by-case, and a great deal of judgment must be applied when they are considered in forecasting.

The learning curve

The learning curve is a tool used primarily to project resource requirements. It has been used successfully to project the direct manufacturing labor hours needed to produce a known quantity of a product and may be used to project the quantity of material required for a production run. It also has been used to project the dollar costs of subcontracted items after adjustment of the historical cost data for inflation.

The learning curve concept originated from the observation that individuals performing repetitive tasks tend to exhibit a rate of improvement due to increased manual dexterity. The mental and muscular adjustments an individual makes from the time he first performs the task to the time he has repeated it a number of times result in a reduction in the time required for each repetition of a uniform unit of work. Psychologists, teachers, personnel directors, manpower planners, and others have used this principle for a long time. When the improvement factor in a manufacturing process is subjected to detailed observation and analysis, the causes of improvement become clear.

Individual dexterity is only one of the reasons for reduced manhours per unit of production. Changes in the worker's environment and morale, changes in the flow process and in work setup, work simplification, and engineering changes may contribute to improvement (or disimprovement). They generally are induced by management actions. Thus, the learning curve actually measures and projects not only the cost effects of improved manual dexterity and a broad group of factors that might be called management innovations, but also the interaction between manual dexterity and management innovations.

For this reason, the term learning curve is a misnomer. Other terms more nearly describe the actual meaning: improvement curve, cost- or time-reduction curve, or experience curve. However, learning curve is used so widely we will use it here. Remember that all the complexities of causal relationships are embodied in its meaning. In essence, it represents the learning of the firm and is not specifically pinned to the learning of individuals.

The learning curve has been used by Government procurement agencies in pricing selected contracts. Its application has been most conspicuous in aircraft production, where conditions are most favorable for its use. More recently, the learning curve has been used as a cost analysis tool for electronics systems, machine tools, shipbuilding, missile systems, and depot level maintenance of equipment.

Current theory was developed from observations of cost behavior as a function of sequential aircraft produced. Certain factors associated with the aircraft industry seem to be necessary to that cost behavior. The first is the building of a sizable, complex end item that requires large numbers of direct labor hours. The many individual tasks associated with these hours provide many opportunities to learn. A second factor is production in which unmechanized assembly operations predominate. If the operations are mechanized or machine-paced, the learning process is inhibited.

Learning curve uses are not limited, however, to sizable, complex end items. Numerous applications have been made to relatively simple and stable items such as artillery shells, trucks, and radios. A Defense Contract Audit Agency publication (DCAAP 7641.14) provides information on more than 440 learning curve applications covering a broad spectrum of weapon systems, subsystems, and other items.

A third factor that influences learning is a continuous manufacturing process with constant pressure to reduce manhours. If production breaks are common or long, the accrued learning is lost through reassignment of workers or even forgetfulness. A fourth factor is the element of constant change in the product.

There is one other observation concerning major engineering or model changes. Airframe production is characterized by short model/series production runs. With each change in model, the learning-curve phenomenon tends to repeat itself. That is, when a production program is completed for a particular airframe model and production is set up for a similar but new model, the hours for the first unit of the new model will not continue where the old model left off.

While the learning curve is essentially a trend concept, it is not a time series trend. Rather, the independent variable is the number of opportunities to learn, while the dependent variable is cost input per constant unit of production. At first this independent-dependent variable relationship may seem obscure. At best it is not likely to seem quite as straightforward as a simple cost per unit time series. You should study this relationship, for it is one of the key concepts that make the learning curve a useful device for measuring and predicting change in production cost input.

A study by the Stanford Research Institute (SRI) validated a learning-curve model known as the "unit curve" or "Boeing" theory. The theory can be stated as follows:

> As the total quantity of units produced doubles, the cost per unit decreases
> by some constant percentage.

The constant percentage by which the costs of doubled quantities decrease is called the rate of learning. Another useful term, the *slope* of the learning curve, is related to the rate of learning. It can be expressed as the difference between 100 and the rate of learning.

The unit curve theory can be expressed in equation or model form as

$$y = ax^b$$

where

y represents the unit cost (usually expressed in hours) of the xth unit,

x represents the unit number,

a is a coefficient (constant) representing the theoretical cost (also usually expressed in hours) of the first unit, and

b is a coefficient (constant) related to the slope and the rate of change of the learning curve. It can be calculated from the relationship

$$b = \frac{\text{logarithm slope}}{\text{logarithm } 2}$$

In this last equation, the slope must be expressed in decimal rather than percentage form.

Observations (values of x and y) related by the model

$$y = ax^b$$

with numerical values for the coefficients form a straight line when plotted on log-log paper. The fact that a learning curve is a straight line on log-log paper has the tremendous advantage that projection of manhour figures at a future stage of production can be accomplished simply by extending the line into the future. This can be done (1) mechanically by physically extending the line, (2) mathematically, or (3) with the aid of a computer for greater precision.

Another frequently used learning curve model is the "cumulative average" or "Northrop" theory, which can be stated as follows:

> As the total quantity of units doubles, the average cost per unit decreases by some constant percentage.

The cumulative average curve theory can be expressed in equation form as

$$\bar{y} = ax^b$$

where

$$\bar{y}$$

is the cumulative average cost of all production up to and including the xth unit. The other parameters are the same as for the unit curve theory. Observations related by this model also form a straight line on log-log paper, and the cumulative average cost can be projected using the same techniques as for the unit theory. You should be alert to the differences between unit and cumulative average cost, because each theory will project a different result.

When manhour figures conforming to the learning process are plotted on log-log paper against the units of production to which they apply, the points produced lie on a straight line called the learning curve. There is no anomaly in calling it a curve when it is a straight line; in mathematical terminology a straight line is a particular case of a curve, having a curvature of zero. With careful attention to detail, the graphical approach to learning curve analysis will yield estimates approximating those derived through mathematical or computer-assisted techniques. Accordingly, you need to understand the mechanics of using log-log paper.

The SRI study revealed that different manufacturers experienced many different slopes, sometimes on similar manufacturing programs. In fact, manufacturing data collected from the World War II aircraft manufacturing industry had slopes ranging from 69.7 percent to almost 100 percent. The slopes averaged 80 percent, giving rise to an industry average curve of 80 percent. Unfortunately, this industry average curve is frequently misapplied as a standard or norm. For estimating slopes without data on the production cost of the item at the plant of manufacture, learning curve slopes of similar items at the manufacturer's plant are a better indicator than industry averages.

You need to know the slope of the learning curve for a number of reasons. For one, it facilitates communication; it is part of the language of the learning curve. The steeper the slope (lower the percent), the more rapidly the resource requirements (hours) decline as production increases. Accordingly, the slope of the learning curve is usually an issue in negotiations.

The slope of the learning curve also is needed to project follow-on costs using either learning tables or a computer. As another example, in many production situations, a slope may be established as a standard on the basis of reliable historical experience. Learning curves developed from actual experience on current production can be compared against the standard slope to determine whether the improvement on a particular contract is or is not reasonable.

The primary use of the learning curve as a pricing tool is to predict the cost of future production. The prediction is based upon the assumption (not always true) that the future will behave as did the past. In terms of the learning curve, this assumption means that the cost (hours) of doubled quantities will continue to decrease by some constant percentage.

As with any prediction method, the learning curve theory is not perfect. Such a simple model cannot cover all pricing situations. However, the learning curve method provides a reasonable approach to predicting the future if the historical data approximate a straight-line trend. The farther historical data points lie from the trend line, the less confidence you can place in the prediction.

The development of a learning curve depends on the company's cost records. The company must devise an accounting or statistical record system that furnishes the necessary data. Otherwise, it may be impossible to construct a learning curve. Such costs as manhours per unit or dollars per unit must be identified with the unit product. It is preferable to use manhours rather than dollars. The latter contain an additional variable, the effect of inflation or deflation (wage rate changes), absent from the former.

The record system must provide definite cutoff points that will permit identification of costs with the units involved. Most companies use a lot release system; costs are accumulated on a job order in which the number of units completed is specified, and costs are cut off at the completion of that number of units. The continuous process method, as distinguished from the job-order system, also yields costs identified with end-item units, but in this case the costs usually are equated with "equivalent" rather than actual units.

Because a job order system commonly is used, the unit cost is not the actual cost per unit for any particular unit in the lot. Rather, it is an average cost for all units in the lot. This means that, when lots are plotted on graph paper, the unit value corresponding to the average cost value must be found. In nearly all cases, this unit value (x) is the median within the lot that should be given the average value. Thus, as the program progresses, the midpoint of each succeeding lot is taken as the plot point for the quantity (x). For example, if a lot is made up of units 91 through 100 of a given contract, the unit value of the plot point would be 95. The calculation is based on the cumulated number of units in all preceding lots plus one-half the number in the lot under consideration:

$$90 + (10/2) = 95$$

Because the early units in the first lot usually decline very rapidly (arithmetically speaking), some distortion may occur in locating the representative value at the midpoint of the first lot. This is especially true if the first lot contains 10 or more units. The distortion is compensated for by a rule of thumb, which states that when the first lot contains 10 or more units, one-third the lot size should be chosen as the unit value estimate of the first lot plot point. Conversely, when the first lot contains less than 10 units, one-half of the lot size should be chosen as the unit value for the first lot plot point.

This arbitrary rule applies to the first lot only, but it approaches the true midpoint more closely than taking half the lot size in every case. True lot plot points can be calculated from a rather complicated formula or by a computer. However, use of a computer to determine the historical trend line and project the future cost eliminates the need to compute lot midpoints.

This discussion of the learning curve theory has been limited to basic considerations. You will need to explore and understand the following topics before you can apply the learning curve technique successfully:

a. Fitting the best straight line through learning data using regression analysis.

b. Unit versus cumulative average data as a straight line.

c. The use of unit, lot, cumulative average, and cumulative total data.

d. Adjusting the projection for major changes in the item.

e. Adjusting the projection for breaks in production.

f. The use of ratio tables to assist in the projection of trends.

g. The use of computer-assisted computations in analysis.

Cost estimating relationships (CERs)

Cost estimating relationships (CERs) are the main point of this section on quantitative measurements. To determine the need for and application of a cost estimating relationship, you need perspective, an inquiring mind, and the ability to reason logically. You need to question and hypothesize about factors that cause costs to be incurred. We will discuss some of the problems.

The first step in developing a CER is to determine what it is that will be estimated and how it will be estimated. If you wish to estimate labor costs, will those costs be estimated by manhours, labor dollars, or something else? Which categories of labor cost will be included in the CER? Which will be excluded?

The second step is to determine which factors will be used to estimate, or drive, the CER. Where you may be able to identify 20 or more factors that cause costs to be incurred, the problem is to isolate the factors that make the most significant contribution to cost incurrence. Simplicity is the goal. The number of factors selected should be the smallest number possible to make the CER as understandable as possible and yet produce acceptable estimates.

The third step is to obtain historical data on both the cost variable and all the driving variables. You may find that you will be unable to use certain desirable cost drivers because data do not exist or data, because of accounting differences, are not comparable. You must clean up the data or discard that variable as a cost driver.

Analyze the data to determine what they contain; all differences must be resolved before they can be used for further analysis. Typical problems involve different models produced in the same production block, accounting changes that change cost classifications from direct to indirect and vice versa, and changes in physical facilities or equipment that may affect manhour requirements. Data also need to be analyzed to determine the effects of product complexity and technical difficulties. Such other factors as quantities produced, production rates, and price-level changes also create data problems. Two major problems that can be compensated for rather easily are quantity and price-level adjustments.

Quantity adjustments are necessary whenever cost data are obtained on different items produced in different quantities. To be comparable, the data must be standardized to a particular unit. This can be done by selecting a particular unit, say unit 100, and using the unit value on an improvement curve at that unit as quantity-adjusted data.

Price-level adjustments are treated by selecting a variable other than dollars, such as labor hours or pounds of material, or by using index numbers to convert the data to base-year dollars

Other adjustments may be needed to make the data used to develop a CER consistent from case to case. Such factors as production rates, capacity utilization, make-or-buy decisions, and subcontracting policies may need adjustment if they have a significant impact on data.

The next step is to determine the nature of the relationship between the dependent and independent variables. A good starting point is to chart the data to determine whether there is a relationship, and if so, what its form is. This is more difficult when there is more than one driving variable because charting techniques may not work well.

Once the nature of the relationship has been hypothesized, it should be tested by using a standard analytical technique like regression analysis to determine how well the data match the hypothesized relationship. It may be necessary to evaluate a number of relationships before selecting one as the CER. In a comparison of alternatives, the "goodness of fit" statistics should not be given undue emphasis, for the ultimate test of any CER is that it be logical and predict well.

A CER is a pricing resource to be maintained and updated as necessary. The maintenance responsibility should be assigned to the organization with the most interest in and opportunity to use the CER. Maintenance is particularly important when there are repetitive buys of the same item. It is inexcusable to develop a CER each time an item is procured. A much better analysis can be performed by refining an existing CER.

Computers and cost models

A computer is a vehicle to use in applying most quantitative tools.

Without a computer, many of the quantitative tools require hours of tedious calculation. Virtually all time-sharing services, both Government and commercial, provide a library of programs that will perform the calculations in minutes. In addition, a computer terminal can be used to analyze large, complicated proposals by using *cost models* to perform computations and consolidations.

A cost model in pricing is a computer program that, when given manhours, rates, factors, other cost information, and formats will perform all calculations needed to arrive at a total (or unit) price, or will perform consolidations by cost element. Cost modeling techniques are used by contractors in developing proposals and by Government personnel to develop independent estimates. A cost model also can be used to check the calculations in a cost proposal, to develop a negotiating position, to make adjustments during negotiations, and to document the results of the negotiation.

Cost models are of varying complexity. The most sophisticated models can make:

a. Elemental cost computations following a given cost accounting format.

b. Intermediate and total cost consolidations by cost element when more than one line item is involved.

c. Either temporary or permanent modifications to a particular cost element. This is extremely useful when a negotiation position is being established or when it is necessary to evaluate a concession being contemplated or offered in a negotiation.

The results of any feature described above can be displayed. For example, given a change in one cost element, a user would have the option of obtaining either the complete cost breakdown or only the total price line.

A cost model can be a substitute for the traditional analytical spreadsheet and has the advantage of rapid turnaround on computations, consolidations, tradeoff assessments, and changes. A cost model also is a process of proposal preparation that uses such techniques as modular, parametric, and statistical estimating. CERs can be integral parts of a cost model, and learning curves and weight parametrics can be computed along with other cost elements.

Cost models are most beneficial when there is a large and complicated program to estimate or proposal to evaluate or when there are a number of smaller proposals from the same contractor. Cost models are particularly useful for field pricing activities that deal with only one contractor or a small number of contractors.

3.10 Contract Pricing Proposals

The requirement for cost or pricing data is governed by the rules laid down in acquisition regulations implementing P.L. 87-653. The contracting officer must require the offeror or contractor (the company) to submit cost or pricing data as part of any noncompetitive proposal over $100,000 and must certify at completion of negotiations that the data are accurate, complete, and current.

The law exempts contracts or subcontracts when the price negotiated is based on adequate price competition, established catalog or market prices of commercial items sold in substantial quantities to the general public, prices set by law or regulation, or in cases where the chief of the contracting office authorizes exemption. In exceptional cases, the agency head or the head of the contracting activity may waive the submission and certification of cost or pricing data. Further, the cost or pricing data requirements do not extend to Government in-lease of a building.

The company must submit the data or identify them specifically in writing. For most procurements, the detailed backup data should be identified rather than actually submitted. However, for procurement of major systems and subsystems, a self-contained, completely detailed proposal is definitely preferred and may be required. Even here, much of the detailed backup data can be identified rather than submitted.

The contracting officer must have the data to evaluate the company's proposal before entering into contract price negotiations. You can understand why when you read in the Federal Acquisition Regulation (FAR) that "cost or pricing data are . . . all the facts that can be reasonably expected to contribute to the soundness of estimates of future costs and to the validity of determinations of costs already incurred." It is obvious that you must get all the data used to develop the offer or proposal in order to prevent disagreement on the facts and to ensure that everyone starts from the same point in estimating the costs of contract performance. You may not use or rely on all the data submitted, but at least you will have the opportunity to decide which facts are relevant and which are not. To do this, you may need data other than those used by the company to make its estimate. If the data are relevant and you need them, you can get them.

When we say "you," we mean the contracting officer and any people asked or told to do something in connection with the contracting and pricing tasks. The contracting officer is the person to whom the proposal is sent and the cost or pricing data are directed, even though a contract price analyst, contract negotiator, or auditor (other members of the procurement team) may receive the cost or pricing data.

Neither the FAR nor the law describes in detail what constitutes submission or identification and how much data is enough. This section presents and describes the standard form that is the instrument for submission or identification of cost or pricing data. Standard Form 1411 (SF 1411), Contract Pricing Proposal Cover Sheet, is the general-purpose form. SF 1412, Claim for Exemption From Submission of Certified Cost or Pricing Data, is the other prescribed form.

SF 1411 shall be submitted in every negotiated procurement over $100,000 if competition is not present. You also may require it in multisource solicitations if you doubt that competition will be effective. You may use this form on negotiated procurements of lesser amounts. Only one fully executed and signed SF 1411 is required with the proposal.

You have the right to obtain whatever data you may need to make the price decision. If you are the PCO, or an ACO operating as a PCO, you are responsible for exercising this right. As a practical matter, this right, as it relates to the kind and amount of data you may request, is limited chiefly by the value of the procurement action and the availability of relevant data from other, earlier procurements.

Historical accounting data are factual and a part of the cost or pricing data described by the FAR. They are relevant to the pricing process even though the offeror may not have used them in preparing the proposal. Similarly, your need to know earlier costs is not affected by the type of contract under which the historical costs were incurred, nor are your rights to access impaired by the type of prior contract. When the provisions of P.L. 87-653 apply, you must require the contractor to submit the costs relevant to your price decision, even if they resulted from work under a firm-fixed-price contract and even if they were not used in preparing the proposal.

The SF 1411 provides for submission of relevant data. By definition, this includes specific identification and description of data when actual submission is not practicable. The FAR provides a general description of a format for cost elements and for the proposed cost estimates, and specifies headings for line-item summaries.

Identification

Fight any temptation to insist on great masses of cost or pricing data. The company is to submit a signed SF 1411 and furnish most of the detailed supporting cost or pricing data by identifying them in writing. Certain schedules and exhibits need to be included with the cost-element breakdowns that support the proposal.

To establish completeness, identification must answer the following four questions:

a. What is it?

b. Where is it?

c. What does it represent?

d. How was it used?

The company will have to supply the answers and do so completely. The what, where, and how are reasonably clear and easy to understand. For "what does it represent?" we would expect to find such things as time period ("year to date through 30 April"), whether the costs are actual or estimated, and whether, if actual, the costs are simple average, moving average, or derived on some other basis. Currency and accuracy are important, but they must be assumed at the time of submission. Subsequent analysis and negotiation may reveal facts that are inaccurate, incomplete, and outdated.

Responsibilities

The company is responsible for submitting or identifying the cost or pricing data. According to the law, the contracting officer must require the company to submit accurate, complete, and current cost or pricing data and later to certify that it has done so. The contracting officer must do this for procurements expected to exceed $100,000, unless they are covered by the exceptions, and for contract changes and modifications expected to exceed that amount.

The requirement also extends to subcontracts in stated circumstances. Under certain circumstances, the contracting officer also may request cost or pricing data for procurements and contract modifications expected to be less than $100,000. If less-than-complete analysis can do the job, the contracting officer can limit the request for data to specific issues and dispense with certification.

Cost or pricing data include, besides historical accounting data, "... such factors as (a) vendor quotations; (b) nonrecurring costs; (c) information on changes in production methods and in production or purchasing volume; (d) data supporting projections of business prospects and objectives and related operations costs; (e) unit-cost trends ... ; (f) make-or-buy decisions; (g) estimated resources to attain business goals; and (h) information on management decisions that could have a bearing on costs."

At completion of negotiations, the company must be asked to certify that all cost or pricing data submitted or identified in writing were accurate, complete, and current as of the time of agreement on price. This certification does not make any representation about the company's judgment in the way it used the factual cost or pricing data to temper its estimate of future costs. In sum, the company is accountable, under the certificate, for the accuracy, currency, and completeness of the cost or pricing data, but not for the quality of its judgment.

In the absence of evidence to the contrary, the contracting officer must ultimately rely on the company's representations that the most current data have been submitted or identified, that there are no errors in the data, and that all data relevant to the price decision have been submitted or identified. Despite this basic dependency, the contracting officer must be satisfied that the data submitted and identified are adequate for pricing the contract. The contracting officer must insist that the company give the needed data and must seek out data from other sources when the company's data do not satisfy needs or are not truly representative.

You must decide if the proposal is supported by cost or pricing data complete to the time of submission. If the submission is complete, you should give the go-ahead to analysis. If it isn't, you must do whatever is necessary to make it complete. You must look to the company for the additional data.

You can misapply these fine words without half trying. As a responsible Government procurement official, you can sit in judgment of the proposal and reject all data that do not meet your standards of completeness. You can wait until all the data are in hand and then give the signal to start cost or price analysis. The only trouble is that all the time you have had the procurement on hold, the required delivery date has been moving inexorably closer. In addition, you can't tell whether the data submitted really are complete until you've used them in analysis. The original submission may look adequate, but it isn't if it doesn't answer the questions that come up as you dig into the detail.

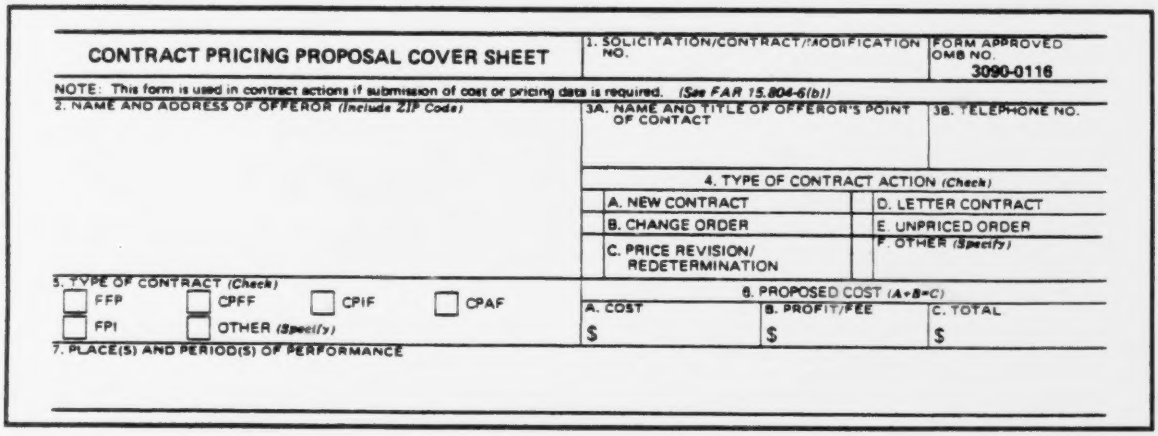
The conclusion should be obvious. In most cases, you should proceed simultaneously to get the added data and the field pricing support. Tell the offeror what else to submit, and at the same time ask for field assistance. When you ask for this help, also tell the ACO what other data you have asked the company to give you.

A closer look at the SF 1411

The Contract Pricing Proposal Cover Sheet, SF 1411, has three principal elements, as follows:

a. General information (1 through 7) (see Figure 3-1).

FIGURE 3-1. GENERAL INFORMATION



CONTRACT PRICING PROPOSAL COVER SHEET

1. SOLICITATION/CONTRACT/MODIFICATION NO.

FORM APPROVED OMB NO.
3090-0116

NOTE: This form is used in contract actions if submission of cost or pricing data is required. *(See FAR 15.804-6(b))*

2. NAME AND ADDRESS OF OFFEROR *(Include ZIP Code)*

3A. NAME AND TITLE OF OFFEROR'S POINT OF CONTACT

3B. TELEPHONE NO.

4. TYPE OF CONTRACT ACTION *(Check)*

☐	A. NEW CONTRACT	☐	D. LETTER CONTRACT
☐	B. CHANGE ORDER	☐	E. UNPRICED ORDER
☐	C. PRICE REVISION/ REDETERMINATION		F. OTHER *(Specify)*

5. TYPE OF CONTRACT *(Check)*
☐ FFP ☐ CPFF ☐ CPIF ☐ CPAF
☐ FPI ☐ OTHER *(Specify)*

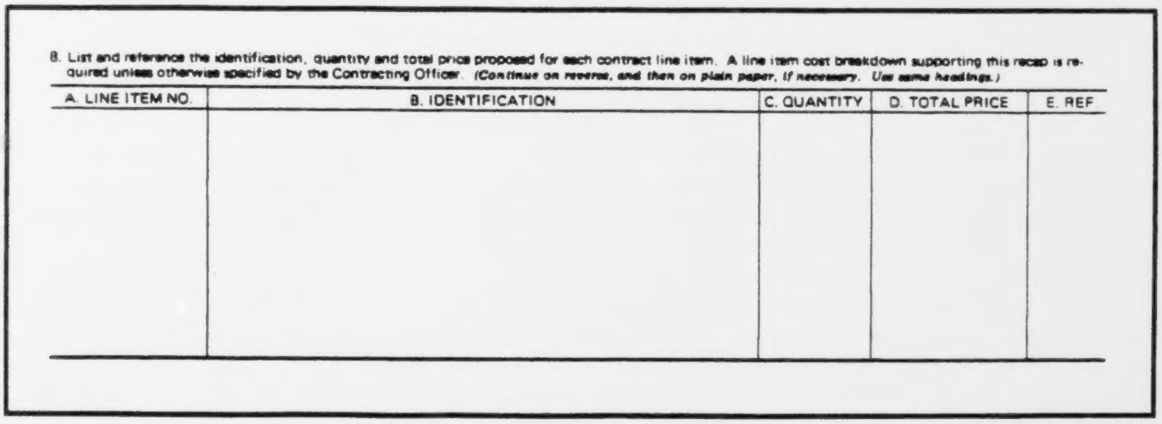
6. PROPOSED COST *(A+B=C)*

A. COST	B. PROFIT/FEE	C. TOTAL
$	$	$

7. PLACE(S) AND PERIOD(S) OF PERFORMANCE

b. Summary information for each contract line item (8) (Figure 3-2).

FIGURE 3-2. SUMMARY INFORMATION FOR EACH CONTRACT LINE ITEM



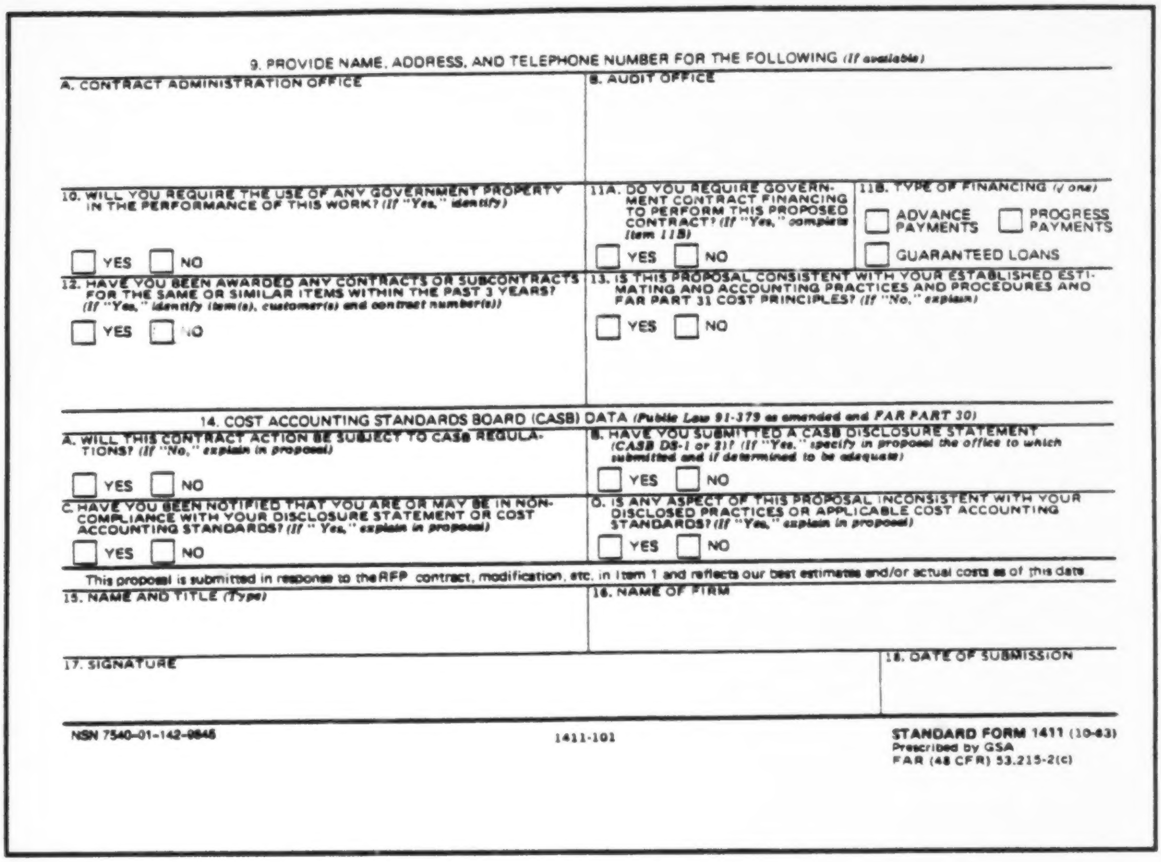
8. List and reference the identification, quantity and total price proposed for each contract line item. A line item cost breakdown supporting this recap is required unless otherwise specified by the Contracting Officer. *(Continue on reverse, and then on plain paper, if necessary. Use same headings.)*

A. LINE ITEM NO.	B. IDENTIFICATION	C. QUANTITY	D. TOTAL PRICE	E. REF

c. Questions and signature (9 through 17) (Figure 3-3).

Instructions for submission of a contract pricing proposal are included at FAR 15.804-6(b), Table 15-2. The several requirements are quoted and discussed in paragraphs that follow.

FIGURE 3-3. QUESTIONS AND SIGNATURE



9. PROVIDE NAME, ADDRESS, AND TELEPHONE NUMBER FOR THE FOLLOWING *(If available)*

A. CONTRACT ADMINISTRATION OFFICE	B. AUDIT OFFICE

10. WILL YOU REQUIRE THE USE OF ANY GOVERNMENT PROPERTY IN THE PERFORMANCE OF THIS WORK? *(If "Yes," identify)* ☐ YES ☐ NO	11A. DO YOU REQUIRE GOVERNMENT CONTRACT FINANCING TO PERFORM THIS PROPOSED CONTRACT? *(If "Yes," complete Item 11B)* ☐ YES ☐ NO	11B. TYPE OF FINANCING *(✓ one)* ☐ ADVANCE PAYMENTS ☐ PROGRESS PAYMENTS ☐ GUARANTEED LOANS

12. HAVE YOU BEEN AWARDED ANY CONTRACTS OR SUBCONTRACTS FOR THE SAME OR SIMILAR ITEMS WITHIN THE PAST 3 YEARS? *(If "Yes," identify item(s), customer(s) and contract number(s))* ☐ YES ☐ NO	13. IS THIS PROPOSAL CONSISTENT WITH YOUR ESTABLISHED ESTIMATING AND ACCOUNTING PRACTICES AND PROCEDURES AND FAR PART 31 COST PRINCIPLES? *(If "No," explain)* ☐ YES ☐ NO

14. COST ACCOUNTING STANDARDS BOARD (CASB) DATA *(Public Law 91-379 as amended and FAR PART 30)*

A. WILL THIS CONTRACT ACTION BE SUBJECT TO CASB REGULATIONS? *(If "No," explain in proposal)* ☐ YES ☐ NO	B. HAVE YOU SUBMITTED A CASB DISCLOSURE STATEMENT *(CASB DS-1 or 2)? (If "Yes," specify in proposal the office to which submitted and if determined to be adequate)* ☐ YES ☐ NO
C. HAVE YOU BEEN NOTIFIED THAT YOU ARE OR MAY BE IN NONCOMPLIANCE WITH YOUR DISCLOSURE STATEMENT OR COST ACCOUNTING STANDARDS? *(If "Yes," explain in proposal)* ☐ YES ☐ NO	D. IS ANY ASPECT OF THIS PROPOSAL INCONSISTENT WITH YOUR DISCLOSED PRACTICES OR APPLICABLE COST ACCOUNTING STANDARDS? *(If "Yes," explain in proposal)* ☐ YES ☐ NO

This proposal is submitted in response to the RFP contract, modification, etc. in Item 1 and reflects our best estimates and/or actual costs as of this date

15. NAME AND TITLE *(Type)*	16. NAME OF FIRM
17. SIGNATURE	18. DATE OF SUBMISSION

NSN 7540-01-142-9845 1411-101 **STANDARD FORM 1411** (10-83)
Prescribed by GSA
FAR (48 CFR) 53.215-2(c)

"1. SF 1411 provides a vehicle for the offeror to submit to the Government a pricing proposal of estimated and/or incurred costs by contract line item with supporting information, adequately cross-referenced, suitable for detailed analysis. A cost-element breakdown, using the applicable format prescribed in 7A, B, or C below, shall be attached for each proposed line item and must reflect any specific requirements established by the contracting officer. Supporting breakdowns must be furnished for each cost element, consistent with offeror's cost accounting system. When more than one contract line item is proposed, summary total amounts covering all line items must be furnished for each cost element. If agreement has been reached with Government representatives on use of forward pricing rates/factors, identify the agreement, include a copy, and describe its nature . . . ."

Comment. The key words are ". . . pricing proposal of estimated and/or incurred costs by contract line item with supporting information, adequately cross-referenced, suitable for detailed analysis." The offeror uses the pricing proposal, a complete package of information, to demonstrate the reasonableness of the offer. You start detailed review and analysis of the package by taking the proposal apart, looking at each cost element and supporting data and following the trail to other data sources. After detailed review and analysis, the elements are revised as necessary and put back together, and the results are compared with the initial offer. Most of the time, the recombined proposal will be close to the Government's negotiation objective.

The offeror may submit cost or pricing data more than once during the negotiation process. The first submission and identification uses the SF 1411. Subsequent submissions will be in writing, but the form will not be used unless design, schedule, or quantity have changed enough to invalidate the original proposal and require a new estimate using new cost or pricing data. The normal updating of data that occurs with the passing of time will be done by the offeror in writing, usually by a dated letter describing the specific cost or pricing data that have been or are being submitted. Such letters should be signed by the offeror's authorized representative. It would help if such letters were numbered serially.

"2. As part of the specific information required, the offeror must submit with offeror's proposal, and clearly identify as such, cost or pricing data (that is, data that are verifiable and factual and otherwise as defined at FAR 15.801). In addition, submit with offeror's proposal any information reasonably required to explain offeror's estimating process, including --

a. The judgmental factors applied and mathematical or other methods used in the estimate, including those used in projecting from known data; and

b. The nature and amount of any contingencies included in the proposed price."

Comment. It is not enough for the offeror to set the cost or pricing data in front of you with a "here it is, come and get it" announcement. The offeror must explain how the package was put together, how it got from known, factual data to the estimate, and how it, the offeror, protected itself from future uncertainties. In other words, the submission will supply words to go with the figures so that understanding is possible.

"3. There is a clear distinction between submitting cost or pricing data and merely making available books, records, and other documents without identification. The requirement for submission of cost or pricing data is met when all accurate cost or pricing data reasonably available to the offeror have been submitted, either actually or by specific identification, to the contracting officer or an authorized representative. As later information comes into the offeror's possession, it should be promptly submitted to the contracting officer. The requirement for submission of cost or pricing data continues up to the time of final agreement on price."

Comment. The requirement to submit is an expression of your right, need, and obligation to be an informed buyer, to know the facts that shape the offer. Specific identification is authorized to reduce the burden of proposing and to tell you where to look for data to help you understand and evaluate significant parts of the proposal.

This instruction covers the aspect of identification and is the key to trackability. For accounting data, the authorized representative referred to likely will be the auditor; for information relating to engineering and production it probably will be the ACO (and any of the ACO's team of specialists).

The identified data will be the details behind the proposal. There will be several layers of data, each more detailed than the preceding, and you will be faced with deciding what you have to see and what you can rely on auditor and ACO to look at. Your decision will not always be the same, even with the same company, auditor, and ACO.

The principal variables influencing your decision will be the value of the procurement (absolute dollars and value in relation to present and projected volume), the frequency of dealings with the company, your relationships with auditor and ACO, the existence of forward pricing rate agreements, and, obviously, the company's attitude and methods of estimating and accounting.

To illustrate, a contract pricing proposal shows manufacturing overhead to be 347 percent of direct manufacturing labor and indicates that this rate is based on a forecast of sales and production volumes and factory expenses for the 18-month period 1 January 19X2 through 30 June 19X3. What else would you need to do your job?

If the 347 percent is a bidding rate agreed to by the ACO, the offeror should have said so. If you were not a party to the negotiation or if you do not have a memorandum from the ACO describing what was done and the conditions of the agreement, get one.

If the 347 percent is based upon a forecast prepared for this procurement, you probably should know the sales and production figures estimated for the period 1 January 19X2 through 30 June 19X3.

You should want figures for past periods to develop trend data, and you might want the data broken down into smaller time increments (monthly, quarterly, semiannually). You probably should get the backup to sales and production figures identified so that auditor and ACO can analyze these factors. You probably should get the overhead pool broken down to show dollars for major account categories and probably should get it in detail. However, you should rely on the auditor to check the detailed entries in those accounts (indirect salaries, depreciation expense, rearrangement, and others) and report back.

For material costs, you will need to decide about individual purchase order and subcontract prices, bills of materials, scrap factors, and backup data supporting costs in all these categories. It boils down to a question of what you need in hand to do a proper job and what you can delegate to the experts in the field.

"4. In submitting offeror's proposal, offeror must include an index, appropriately referenced, of all the cost or pricing data and information accompanying or identified in the proposal. In addition, any future additions and/or revisions, up to the date of agreement on price, must be annotated on a supplemental index."

Comment. This requirement is essential to tracking the flow of data and indispensable later, in the event of questions as to currency, completeness, and accuracy of data relied on in evaluating the proposal.

"5. By submitting offeror's proposal, the offeror, if selected for negotiation, grants the contracting officer or an authorized representative the right to examine those books, records, documents, and other supporting data that will permit adequate evaluation of the proposed price. This right may be exercised at any time before award."

Comment. Adequate evaluation of cost or pricing data submitted or identified may require you to examine data beyond those used by the company in preparing its offer. This note states that proposal submission gives you the right to do this when necessary.

"6. As soon as practicable after final agreement on price but before the award resulting from the proposal, the offeror shall, under the conditions stated in FAR 15.804-4, submit a Certificate of Current Cost or Pricing Data."

Comment. After negotiations, the offeror will have to sign a certificate that the cost or pricing data submitted and identified were accurate, current, and complete as of the date of agreement on contract price. There will be times when the offeror will not execute the certificate until after going back to the plant to make sure all relevant data had been submitted.

"7. HEADINGS FOR SUBMISSION OF LINE-ITEM SUMMARIES:

A. New Contracts (including letter contracts) (Table 3-6).

TABLE 3-6

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)

Under Column (1) -- Enter appropriate cost elements.

Under Column (2) -- Enter those necessary and reasonable costs that in offeror's judgment will properly be incurred in efficient contract performance. When any of the costs in this column have already been incurred (e.g., under a letter contract or unpriced order), describe them on an attached supporting schedule. When preproduction or startup costs are significant, or when specifically requested to do so by the contracting officer, provide a full identification and explanation of them.

Under Column (3) -- Optional, unless required by the contracting officer.

Under Column (4) -- Identify the attachment in which the information supporting the specific cost element may be found. Attach separate pages as necessary."

Comment. The offeror is to submit a summary cost breakdown for each line item in a format consistent with its accounting and estimating practices and support each cost element in the breakdown with schedules. Both breakdowns and supporting schedules are to be submitted by use of an SF 1411.

"Appropriate cost elements," column (1), are direct material, including raw material, purchased parts, and subcontract items; direct labor; indirect costs; other costs; and profit or fee. These are descriptive terms; the offeror will use the terms it uses in accounting and estimating. The instructions regarding total cost, column (2), are easy to read right through; but don't do it and don't let the offeror do it, either. They say that offeror must show you what costs, if any, have been incurred. This intelligence may be of limited value except for purchase order and subcontract prices, unless the work is pretty well along. If it is a follow-on to earlier work, however, even the labor costs for the first few units of work may show a trend you can use in analysis.

The need to identify and explain preproduction costs is obvious. Get a clear handle on this. It is a nonrecurring element that can distort later comparisons, and it may be the proper subject of an advance agreement. Be alert to the possibility that preproduction effort might be required and its cost buried in the depths of individual cost elements.

Use of the unit cost column, (3), would be meaningless for a multiple line-item proposal covering two or more distinctly different items or types of effort. Similarly, in a multiple-line-item proposal, the total cost column serves (in accounting language) as a reconciliation account, a computation that proves that the whole is in fact the sum of its several parts.

"B. Change Orders (modifications) (Table 3-7).

Under Column (1) -- Enter appropriate cost elements.

Under Column (2) -- Include (i) current estimates of what the cost would have been to complete deleted work not yet performed, and (ii) the cost of deleted work already performed.

Under Column (3) -- Include the incurred cost of deleted work already performed, actually computed if possible, or estimated in the contractor's accounting records. Attach a detailed inventory of work, materials, parts, components, and hardware already purchased, manufactured, or performed

TABLE 3-7

COST ELEMENTS (1)	ESTIMATED COST OF ALL WORK DELETED (2)	COST OF DELETED WORK ALREADY PERFORMED (3)	NET COST TO BE DELETED (4)	COST OF WORK ADDED (5)	NET COST OF CHANGE (6)	REFERENCE (7)

and deleted by the change, indicating the cost and proposed disposition of each line item. Also, if offeror desires to retain these items or any portion of them, indicate the amount offered for them.

Under Column (4) -- Enter the net cost to be deleted which is the estimated cost of all deleted work less the cost of deleted work already performed. Column (2) less Column (3) = Column (4).

Under Column (5) -- Enter the offeror's estimate for cost of work added by the change. When nonrecurring costs are significant, or when specifically requested to do so by the contracting officer, provide a full identification and explanation of them.

Under Column (6) -- Enter the net cost of change which is the cost of work added, less the net cost to be deleted. When this result is negative, place the amount in parentheses. Column (4) less Column (5) = Column (6).

Under Column (7) -- Identify the attachment in which the information supporting the specific cost element may be found. Attach separate pages as necessary."

Comment. This format is designed to facilitate pricing of change orders. How to price changes is discussed in Chapter 10.

"C. Price Revision/Redetermination (Table 3-8).

TABLE 3-8

CUTOFF DATE (1)	NUMBER OF UNITS COMPLETED (2)	NUMBER OF UNITS TO BE COMPLETED (3)	CONTRACT AMOUNT (4)	REDETERMINATION PROPOSAL AMOUNT (5)	DIFFERENCE (6)

COST ELEMENTS (7)	INCURRED COST - PREPRODUCTION (8)	INCURRED COST - COMPLETED UNITS (9)	INCURRED COST - WORK IN PROCESS (10)	TOTAL INCURRED COST (11)	ESTIMATED COST TO COMPLETE (12)	ESTIMATED TOTAL COST (13)	REFERENCE (14)

Under Column (1) -- Enter the cutoff date required by the contract, if applicable.

Under Column (2) -- Enter the number of units completed during the period for which experienced costs of production are being submitted.

Under Column (3) -- Enter the number of units remaining to be completed under the contract.

Under Column (4) -- Enter the cumulative contract amount.

Under Column (5) -- Enter the offeror's redetermination proposal amount.

Under Column (6) -- Enter the difference between the contract amount and the redetermination proposal amount. When this result is negative, place the amount in parentheses. Column (4) less Column (5) = Column (6).

Under Column (7) -- Enter appropriate cost elements. When residual inventory exists, the final costs established under fixed-price-incentive and fixed-price-redeterminable arrangements should be net of the fair market value of such inventory. In support of subcontract costs, submit a listing of all subcontracts subject to repricing action, annotated as to their status.

Under Column (8) -- Enter all costs incurred under the contract before starting production and other nonrecurring costs (usually referred to as startup costs) from offeror's books and records as of the cutoff date. These include such costs as preproduction engineering, special plant rearrangement, training program, and any identifiable nonrecurring costs such as initial rework, spoilage, pilot runs, etc. In the event the amounts are not segregated in or otherwise available from offeror's records, enter in this column offeror's best estimates. Explain the basis for each estimate and how the costs are charged on offeror's accounting records (e.g., included in production costs as direct engineering labor, charged to manufacturing overhead, etc.). Also show how the costs would be allocated to the units at their various stages of contract completion.

Under Columns (9) and (10) -- Enter in Column (9) the production costs from offeror's books and records (exclusive of preproduction costs reported in Column (8)) of the units completed as of the cutoff date. Enter in Column (10) the costs of work in process as determined from offeror's records or inventories at the cutoff date. When the amounts for work in process are not available in contractor's records but reliable estimates for them can be made, enter the estimated amounts in Column (10) and enter in Column (9) the differences between the total incurred costs (exclusive of preproduction costs) as of the cutoff date and these estimates. Explain the basis for the estimates, including identification of any provision for experienced or anticipated allowances, such as shrinkage, rework, design changes, etc. Furnish experienced unit or lot costs (or labor hours) from inception of contract to the cutoff date, improvement curves, and any other available production cost history pertaining to the item(s) to which offeror's proposal relates.

Under Column (11) -- Enter total incurred costs (Total of Columns (8), (9), and (10)).

Under Column (12) -- Enter those necessary and reasonable costs that in contractor's judgment will properly be incurred in completing the remaining work to be performed under the contract with respect to the item(s) to which contractor's proposal relates.

Under Column (13) -- Enter total estimated cost (Total of Columns (11) and (12)).

Under Column (14) -- Identify the attachment in which the information supporting the specific cost element may be found. Attach separate pages as necessary."

Comment. This format is designed to facilitate revision of contract prices. The instructions give explicit guidance to the contractor as to the supporting information to be supplied. Analysis and negotiation of price revisions and redeterminations are discussed in Chapter 10.

3.11 Cost Analysis

Regulations generally require cost analysis for noncompetitive procurements and contract modifications estimated to exceed $100,000. As a practical matter, they permit cost analysis, with cost or pricing data submitted by the contractor, for procurements under that amount. Unless there is ample procurement history, it can be very difficult to come up with a price you're sure is reasonable, especially if the item is a military one you must buy from its designer. You may need to use all tools, including cost analysis, even on a $30,000 buy.

When requesting cost or pricing data in order to analyze a buy expected to be under $100,000, you can ask for less-than-complete data. For example, you might tell the contractor to give you accurate, complete, and current data for the material cost, but to forget about detail supporting the labor and overhead costs. Labor is a small part of the cost of this buy, and you know from past buys that labor cost is as low as it is likely to go. Overheads were checked out in detail on a big procurement last month and it is reasonable to use the same rate. When you ask for less-than-complete data, the contractor does not have to execute a certificate of current cost or pricing data.

Although you will observe this concept of less-than-complete cost analysis for procurements under $100,000, you will still be sure to ask for and get the data you need to negotiate a fair and reasonable price. If you need complete data, ask for them and, in that case, the contractor will execute a certificate.

Cost analysis requires you to evaluate each specific element of the proposal to prove the reasonableness of the pricing arrangement offered. When you evaluate costs, you try to identify the costs necessary to contract performance, establish the costs that are reasonable, and isolate any contingent amounts.

Cost estimates

A cost estimate is what you get with a SF 1411, although it is probably not in its purest, most pristine form when it gets to you. We usually assume that the estimate is a projection from the plateau of the most current experience. The "most current" would probably be a blend of recorded production costs of items already on order and the estimated or actual prices from vendors and subcontractors for the contract effort being priced out.

It is not always that neat. As we've already suggested, companies have many ways to prepare estimates. We don't believe they can do a good job without referring to and using actual cost experience, at least as a check on the validity of figures developed in some other fashion. It is necessary for the offeror to check current cost experience, but even if the offeror didn't, our procedures are set up to use actual costs for that purpose.

Certified cost or pricing data

Specific allegations of overpricing led, in 1962, to the passage of P.L. 87-653. The law is quite simple. The contracting officer must require the contractor to submit cost or pricing data and to certify that they are complete, accurate, and current as of the time of price agreement. The law provides for a price adjustment if it is later found that the data were not complete, accurate, and current and gives the Government audit rights to assure that the data were as certified.

These requirements apply to all negotiated contracts and contract modifications expected to exceed $100,000, unless the price negotiated is based on adequate price competition, established catalog or market prices of commercial items sold in substantial quantities to the general public, or prices set by law or regulation. The law permits exemption or waiver in special cases and places the requirements on both prime contractors and subcontractors at every tier.

This simple law has not been simple to implement. *Submission* seems easy to understand, but consider the extremes. Literal submission, for even a relatively small contract, could amount to stacks and stacks of the paper used to develop a proposal and could include the contractor's actual books of accounts. At the other extreme, a contractor might say, "Here is my office and plant. All my data are here. You are welcome to look at them."

Because neither extreme is satisfactory, the implementation requires submission either actually or by specific identification in writing. Some data are submitted along with the proposal. Data supporting financial figures should be identified for audit purposes. Field pricing support personnel need to know the location of these data.

Certification at time of agreement sounds simple. A contractor operating under a letter contract at the time the price is agreed to is doing things daily in purchasing, engineering, and production that can affect the price. These facts must be brought to the negotiation table if they are significant. Updating used to be required right up to contract award, which could occur three to six months after agreement on price. This was cumbersome for both contractor and Government; literal compliance was virtually impossible.

A definite cutoff date was needed, so the procedure was changed to make the date of handshake, the date of final agreement on price, the cutoff point. The contractor is given a reasonable period after the handshake to make sure everything is in order before certifying. A date as soon as possible following price agreement is shown on the certificate. Data coming into the system after that date cannot be used to sustain a claim of defective pricing.

Another complication is that some data are not reasonably available until they have been processed through accounting. For example, overhead rates are developed periodically, usually some days after the end of the period in which costs have been incurred.

In this case, the contractor and the contracting officer agree on a reasonable time against which to test currency. They may agree that overhead rates are not available until 20 days after the end of a month. Therefore, when the contractor certifies on the 19th of the month that its data are current, it is understood that last month's data are not available. The agreement upon which this understanding is based should be described in the memorandum of negotiations.

The exceptions to the requirement for certified cost or pricing data cause some problems. At the RFP stage, you may not know whether or not adequate price competition will exist. You must weigh several things. Will there be time to get cost or pricing data later if there is not competition? Can you even determine that there is effective price competition without first getting cost or pricing data? You often may decide to request the data with the proposals. Occasionally the proposals may be analyzed by the field pricing team. If you decide in the end that competition was present and effective and accept an offer, there is no need to get the cost or pricing data certified. If, for any number of reasons, the competition is not effective, you must get the data certified.

You may waive the requirements for data and certification whenever a transaction falls within the intent of the exceptions but, for some technical reason fails to meet the letter of the law's implementation.

A good example is a catalog price where the total product line is sold in substantial quantities to the general public but the individual item cannot be traced as having actually been sold in quantity. If you can tell that the pricing of the item is consistent with other items in the catalog, some of which have been sold commercially, or if a comparable (but different) item that will do the job has been sold at higher prices, the intent of the exception to the law has been met and cost or pricing data are not required.

Generally, waivers should not be used to relieve contractors of their responsibilities under the law. What sometimes happens is that a contractor believes it has complied with or should be exempted from the requirements of the law, but the Government does not agree. This can result in lengthy negotiations, discussions, and debates.

After these negotiations, it is sometimes advisable to request a waiver if the Government has done everything possible to obtain certified data, provided the price is not obviously unreasonable and the contractor is adamant in its position. If there is real doubt about compliance and the price is unreasonable, you should refuse to do business with the contractor.

Certified cost or pricing data are facts. Facts can be verified, but judgment based on facts cannot. For example, the labor hours incurred in past production of an item are fact, but the decision to use x rather than y hours as the estimate is judgment. The actual labor hours incurred later are not facts during the negotiation. The machining process used on past production is fact. A plan to buy new machines for future production is fact. The purchase of new machines later without having been planned at the time of price agreement is not fact at the time of negotiation. A change in accounting procedures since the last rate was calculated is fact. The estimate of a new rate for the next period is fact. The actual rate is not fact at the time of negotiation.

Facts are what are certified to be complete, accurate, and current. That there was an estimate or plan is relevant. If the estimate is wrong, if the plan does not materialize, or if new facts develop, these considerations are not relevant. If the two parties are armed with the same facts, it is presumed that they can negotiate reasonable prices. If results turn out differently, that's the breaks. If facts are wrong, the price will be reduced. Adjustment under the law is downward only because the contractor knew the facts and should have told you if they were significant and relevant.

By requiring the contractor to submit cost or pricing data and to certify at completion of negotiations that such data were complete, accurate, and current, we make it imperative that the contractor continually review the available data and submit or identify in writing to the contracting officer all facts that, within reason, might be expected to affect the price negotiations. "Within reason" is another way of saying "reasonably prudent buyers and sellers."

The defective pricing data clause that backs up the certification places extreme importance on the ability to determine, at some time after contract award, what cost or pricing data you relied on in negotiations. The purpose is to be able to reduce the contract price to what it would have been if you had not relied on incomplete, noncurrent, or inaccurate data.

The trail that must be followed here is tenuous, at best. It goes from contract pricing proposal, to Government analyses, to most recent data. This puts a heavy load on the pricing documentation, because it must identify the factual data that were submitted and certified to, distinguish the judgmental from the factual, and highlight the data that were not relied on. How this can and should be done will be demonstrated in Chapter 8.

Cost accounting standards

The Cost Accounting Standards Board (CASB) was created by P.L. 91-379. The Board promulgated rules, regulations, and standards that, in general, apply to the same contracts as does P.L. 87-653. One major difference is that competitive contracts, other than those awarded as a result of sealed bidding, are not exempt from CASB requirements.

Contractors subject to CASB requirements must disclose their accounting practices under specified circumstances and estimate and accumulate costs in compliance with that disclosure. The practices must be consistent with the standards, rules, and regulations promulgated by the Board and with the cost principles enunciated in the acquisition regulations. These standards are not the same as the cost accounting techniques described as *standard costs* but are rules to be followed under any method of costing for Government contracting. You should call the ACO if you question whether the contractor's practices are consistent with CASB requirements.

The Board's rules don't change the way in which you analyze costs. The law helps by specifically requiring that the methods of proposing, booking, and reporting costs be consistent.

Contract cost principles

Contract cost principles are tools for use in cost analysis. The acquisition regulations establish general principles and procedures to follow in determining the acceptability of contract (and, in certain cases, subcontract) costs for various purposes, including negotiation objectives (using estimated or estimated and recorded costs), regardless of the pricing arrangement; reimbursement under cost-reimbursement arrangements; determination of overhead rates for past periods; and settling or otherwise closing out terminated contracts or parts of contracts.

Contract cost principles were written originally to establish principles for determining acceptable costs under cost-reimbursement arrangements. The cost principles have been restated more broadly and now also must be used when developing negotiation objectives for fixed-price arrangements.

Reasonableness, allocability, appropriate application of generally accepted accounting principles and practices, and any exclusions or limitations of the acquisition regulations or the contract should be considered in determining the validity of a cost item. An allowable cost is one that is incurred or is to be incurred in the performance of a contract and meets the criteria enunciated in the acquisition regulations and the contract.

You analyze a proposal to decide what costs to use in developing your negotiation objective and what price you want to pay. In the negotiations that follow, you will discuss the specific costs in the contract pricing proposal in order to test the soundness of your original conclusions. New facts and updated data will be submitted (in writing) throughout the negotiation process. New facts or new interpretations of facts already submitted may cause you to adjust the specific cost values in your objective, and you ultimately will reach agreement with the contractor.

When you analyze a proposal, you look for cost data, hopefully for the costs of current production of the same item. You review these costs to see whether they will apply to future work, whether they are reasonable and necessary, whether some parts of certain costs should be excluded from consideration for reasons cited in the cost principles, and whether there are discernable trends that can be expected to continue. You sort out your ideas and come up with a negotiation objective. A negotiation objective provides a basis in fact for subsequent negotiations.

If this is a cost-reimbursement arrangement, your objective is an estimated cost for funding purposes, fee dollars (if CPIF, CPAF, or CPFF), share arrangement (if CPIF), and any advance understandings you may want to reach on treating costs. You apply the contract cost principles in evaluating reasonableness of past as well as projected costs and in reaching advance agreements. Later you will apply the same principles during contract performance. You will use them when looking at vouchered incurred costs to decide how much the contractor should be paid for its efforts.

If this is an FFP arrangement, your objective is a price. You use cost principles in adjusting actual costs to use as a platform for projecting what it should cost to do the job you are pricing. In building your objective, you consider trends and factor in the most current cost experience. However much these adjusted actual costs influence the level of your price objective, and no matter how much weight you give the various costs in rationalizing the fixed price you finally agree to, what it actually costs to do the job will not change the cost to the Government.

If this is an FPI arrangement, your objective is a contract including, besides a target price, targets for cost and profit, a sharing arrangement, and a ceiling price. You use the cost principles as you would in negotiating an FFP arrangement. However, here the price ultimately paid depends on the costs of doing the work and upon the difference between the target cost and the negotiated final cost.

In negotiating final cost, you apply the cost principles, with emphasis on the reasonableness of and need for incurring the costs. You apply the principles in reviewing actual costs of contract performance in the way you did earlier in evaluating past costs and their impact on the estimate supporting the initial proposal. You use cost principles to establish a negotiation objective and a final cost figure you are willing to use in settling the contract price, and you negotiate on that basis.

There are five questions to answer in determining the reasonableness of a given cost:

a. Is the cost generally recognized as ordinary and necessary to the conduct of the business or performance of the contract?

b. Do such things as generally accepted sound business practices, arm's-length bargaining, laws, regulations, and contract terms and specifications impose restraints or requirements on the company?

c. Would a prudent businessman take this action in the conduct of a competitive business, considering obligations to the owners of the business, employees, customers, the Government, and the public at large?

d. Have the costs been increased by significant deviations from the contractor's established practices?

e. Are the costs allowable under the acquisition regulations? (Even though you must use the regulations in analyzing costs under fixed-price arrangements, you don't have to reach agreement with the contractor on each element of cost. Your record of negotiation will show how you used the cost principles in establishing your objective, but you only have to reach agreement on the price.)

Dollar value

The size of the procurement, in terms of both unit and total prices, should help you decide what to do and how far to go in analysis. Dollars are not the only criterion, particularly when you remember that you may request some cost or pricing data on buys of less than $100,000. Nevertheless, as a general principle, you will spend less time on the smaller dollar proposals.

You must be selective because there are a limited number of people who can help in the analysis and they are not available on an unrestricted basis. Selectivity means that some proposals will get greater attention than others because of dollar impact. Dollar importance may be measured by the value of the present proposal, the future value of the program, or outside interest in the procurement because of socio-economic impacts. Value may be in terms of the absolute dollars to be spent on the procurement or in terms of the contract dollars in relation to the offeror's sales volume.

The general rule is that you apply the most effort to the larger dollar procurements and spend the most time on any one procurement in the cost areas where the most dollars are concentrated or where the most serious doubts as to validity exist. However, these generalities don't help much in the individual case.

For negotiated contracts over the dollar thresholds established in the acquisition regulations, the contracting officer or authorized representative must request field pricing support (including an audit review by the contract audit activity) unless current data are adequate to justify a waiver of field pricing support.

There is no one answer. However, a natural selectivity is built into the process. Certain procedures necessary and appropriate to large-dollar procurements are eliminated in the smaller deals because they are not needed. The estimating task is different in part because prior, actual cost or pricing data may play a larger role.

There is a stratification of sorts. The largest buys are for the biggest, most involved equipments. The amount of data needed to prepare a proposal for a high-dollar procurement is greater, generally, unless the dollars result from a vast quantity of low-dollar items. Therefore, you will get more data on the larger procurements and spend more time in analyzing and negotiating them.

Ratio of Government to total business

If a company (or the segment of the company with which you are dealing) is engaged in a competitive, commercial enterprise and sales in that market account for a predominant part of the company's revenues, you may assume that cost control is pursued vigorously and that the costs of alternative methods are considered in management's decisions. Within limits, in such a circumstance, you may conclude that the company's Government sales will receive the same management scrutiny.

Even if you can't completely rely on the carry-over benefits from the competitive market or rely on its influence across the board in all areas of cost, you may be able to spend less time, without sacrificing confidence in results, in analyzing overhead costs. You may be able to assume that the number and kinds of people employed are necessary to the successful conduct of the business and that the monies paid them in salaries, wages, and fringe benefits are reasonable.

You don't just assume all this, however, without a basis in fact or conclusions based on reviews of the company's operations, on experiences with several different proposals, and on participation in several negotiations. Even then, you can't ignore the fact that the company's objectives will be different from yours and that, for good reasons of its own, the management may make decisions at any time that can prove costly to the business segment you're interested in.

The principle underlying these words is this: you can rely on the management of one company more than you can on the management of another. This means you can and should be selective in using your time, and concentrate, within one company's proposal, on the areas of weakness or concern, areas where there is likely to be error, overstatement, extravagance, or waste; you should be selective in apportioning your work among proposals.

Inventory position

Before going too far in analyzing any estimate of future costs, evaluate the offeror's inventory position. For example, an increase in material costs may deserve little consideration in a forecast if the company has on hand considerable stocks bought at lower prices and uses first in, first out (FIFO) to price the inventory.

Also, projections need not show a wage increase right away if a good part of the work in process has been completed at the lower rates. Considerations related to the timing of the negotiation in conjunction with the inventory position and the leadtimes of all elements are important, especially in letter-contract definitizations and prospective FPR contracts. Even if there is no prospect of changes in either material or labor prices, this check may give you actual, rather than estimated, prices for some of the components of the equipment you now are buying.

Uncertainties

The negotiated price must be based on, and justified by, all available and current cost or pricing data submitted by the offeror. It must be based on an educated and intelligent interpretation of present facts and must represent realistic judgment. Nevertheless, it is still a guess or, more formally, a conclusion as to what should happen during a future performance period.

Thus, in varying degree depending on the procurement situation and the skills of the negotiators, there may be uncertainties in the estimating assumptions made. Some factors that affect uncertainty are extent of effective price competition obtained, availability of historical cost and performance information on like or similar work, clarity and detail of the work statement or specifications, likelihood of substantial increase or decrease from the plant volume forecast at the time of negotiations, likelihood of program or design changes subsequent to negotiations that will not require contractual changes or repricing, and the likelihood that anticipated test or production problems will fail to materialize or that unanticipated problems will materialize.

When you evaluate uncertainties you may find that they are closely related to areas frequently suggested for consideration in selecting a pricing arrangement. These are type and complexity of the item, stability of design, and length of contract performance or production run.

Because complexity is relative, it must be evaluated in terms of the extent of change from earlier models of the same or similar products. It requires an analysis of differences. Complexity also may be measured by the number and type of operations required in manufacture or, if the work is developmental, the number and kind of scientific disciplines that must be used to produce the desired answer or prototype. Generally speaking, the greater the number of manufacturing and scientific skills required, the more complex the job and the greater the cost uncertainties involved in performance.

Similarly, there is a relationship between stability of design and performance uncertainty. Without a reasonably stable design, specifications may not indicate clearly the scope of effort required. The resulting inability to write a clear, precise statement of work makes it highly unlikely that the responses to a multisource solicitation will be comparable enough to permit award solely on the basis of price.

Without a reasonably stable design, comparative price analysis is extremely difficult and the amount, reliability, and relevance of available cost data and prior production experience are reduced. Stated positively, a reasonably stable design permits adequate specifications, which in turn, depending to some degree upon the type and complexity of the product, make adequate price competition possible or lend validity to any prior cost and production information.

Obviously, the longer the period covered by the estimate, the greater are the number of variables injected into the procurement situation. For example, a long interval between award and first delivery may mean a high degree of design, tooling, and prototype engineering and testing.

As another example, a long interval between the first and last direct labor hour to be expended on a per-unit basis may indicate a high proportion of production engineering and a correspondingly high degree of complexity. Even when an item has been made in quantity, a change in production rate or an extension or compression of the prior time span may alter the usefulness of actual cost data.

The existence of performance uncertainties does not, in itself, preclude negotiation of a pricing arrangement that imposes significant cost responsibility upon a contractor. What is important is the ability to analyze and agree upon what the uncertainties are, the likelihood of their happening during performance, and the possible impact on costs if they do occur.

For example, a *contingency* in an estimate does not mean that use of an FFP arrangement is out. Neither does it mean that an incentive arrangement is beyond consideration. Instead, remember that any estimate is a projection of what costs should (or might) be, and the difference between a realistic estimate and provision for a contingency is one of degree -- not that one is good and the other bad.

Rather than talk about contingencies, we should think instead in terms of unsupported or poor estimates. If an event is possible and experience supports the probability of its occurrence, it may be okay for the estimate. When contingencies are quoted, however, you may question the magnitude of the event if it should occur. There can be a difference of opinion as to the likelihood of the occurrence.

If based upon factual interpretation, either point of view could cause the estimate to be revised. Thus, negotiation of an FFP arrangement at a realistic level may be both possible and appropriate if the uncertainties are identified and an evaluation of available information leads to a consensus on the likelihood of occurrence and possible cost.

We've said that evaluating uncertainties is judgmental and that it is a matter of degree. A flat percentage factor, a *plug*, a *cushion*, or *water*, does not deserve serious consideration. However, a percentage used to project a price factor may be acceptable if a reasonable basis supports its use. The learning curve exemplifies this. It is based on an assumption of what is likely to occur, but obviously there can be no positive assurance that actual events will follow the projected curves.

In the final analysis, the ability to analyze and evaluate performance and cost uncertainties and to negotiate a pricing arrangement with an acceptable degree of cost risk depends on the adequacy of available information. In turn, a decision about adequacy depends to a large extent upon the experience, skill, and attitude of the negotiator.

As a program progresses from research through successive stages to design maturity, technical problems are solved and increasing amounts and kinds of supporting data become available. There generally is a direct relationship between the stage in this progression, the degree of uncertainty involved in contract performance, the availability and adequacy of data, and the pricing arrangement suited to the procurement.

In the earliest stages of research and exploratory development, there may be many technical unknowns and, as a consequence, little meaningful data, except to the extent that ratios and similar statistical tools have been developed from analyzing earlier research or study programs. Here a CPFF or other cost reimbursement arrangement may be used if the magnitude of performance uncertainties or the likelihood of their occurrence cannot be measured.

Once the development stage, calling for fabrication and testing of prototypes, has been reached, definitive data tied to the particular program begin to enter the system. Effective use also can be made of statistical data from other, earlier programs. Use of a CPFF arrangement may still be appropriate, but use of CPAF, CPIF, FPIS, and even FPIF may become realistic alternatives.

In the production stage, costs of representative lots of completed items or specific parts making up the end item become available, many technical uncertainties have been removed, and use of FPI or FFP arrangements generally is feasible. Finally, when the design has become reasonably stable, negotiation of an FFP arrangement may be considered the only practical alternative. How soon these events occur depends to some degree on the complexity of the product and the dollar value of the procurement.

Of course, there are many variables in actual procurement situations, and in some programs the later stages discussed may never be reached because technological breakthroughs and advances change the requirements. Remember, however, that with the passage of time and the movement from one development stage to another, your knowledge and that of the contractor increases. At the same time, the complexity of the problems and the difficulty in analyzing and evaluating performance uncertainties decrease.

In the later stages, as design becomes more stable and uncertainties are reduced, you can consider developing price competition among responsible firms able to build the product.

Technical analyses

It is not enough to verify the number of hours, the amounts and cost of materials, and the rates for labor and overhead from accounting records. It is not enough to project the actual cost experience and call it the estimate of future costs. You must get behind the accounting data and evaluate the functions that cause the costs. You need to analyze hours, quantities, tooling, testing, head counts, productivity, and similar factors. This analysis demands knowledge and insights thought to be common to trained engineers. Depending on the task, you might seek help from mechanical, electrical, electronic, chemical, aeronautical, naval, civil, or other engineering disciplines, but an industrial engineer is likely to help the most.

Accounting records can tell you what it has cost to do a job and what it probably will cost if there are additional costs for the same or similar work. Accounting records can identify scrap, spoilage, rework, and downtime costs and help you evaluate a bill of materials, but they are of limited value when you try to determine whether those costs and quantities are reasonable and necessary for future work. That's where the technical skills come in. You will need technical judgments to determine reasonableness.

For direct material, an engineer can help you analyze both the kinds of materials and the so-called use factors. The engineer can tell you if the raw stock sizes are the most economical for the job. All raw stock must be cut, formed, milled, bent, or otherwise worked in some fashion. These actions produce scrap. The amount of scrap can vary significantly depending on the starting size and shape and the process used to form the finished material. An engineer can give you informed opinions on both aspects.

Hand, semiautomatic, or automatic operations, together with the tolerances required in machining, can influence the amount of scrap and the production time required. An engineer may be able to review the operations and the pricing factors and tell you whether the factors reflect the actual operations and whether the actual operations are reasonably efficient.

As a rule, standard parts used commercially carry lower prices than do specially designed parts. An engineer may be able to suggest standard parts that can be substituted without impairing performance or reliability.

For direct labor, an engineer can help you evaluate the number and types of personnel it takes to do a job. The engineer can point out differences between the estimated labor mix and the planned operations; as, for example, if the plans are to do the work on automatic machines, not by the hand operations used in the estimate. The engineer also can help determine whether the time standards used in estimating have been computed correctly.

For indirect costs, an engineer can help you review the budget and may be able to tell you whether it can be characterized as a lean, minimum requirements budget. The engineer may be able to tell you whether the company used industrial engineering techniques to establish the number and skill levels of indirect labor personnel and whether it has followed the advice of its industrial engineers.

The foregoing are suggestions about how engineers at the buying office and in the contract administration organization can help in cost analysis. Specialized technical help also may be obtained from production, packaging, and quality assurance specialists.

Your task is not diminished when you get outside help. In a very real sense, the demands on you are increased. You must know enough to ask the right questions and you must evaluate and even challenge the answers you get from the specialists. You must not get trapped into accepting advice on the strength of the advisor's title. You need to know reasons and to be sure they are sound. Eventually, you should acquire enough special knowledge on these matters to analyze the technical aspects of many cost proposals yourself.

Should-cost

The objective of cost analysis is to arrive at a realistic price. A realistic price is a reasonable price. The judgment that a price is reasonable is based on an estimate of what is attainable, an estimate of what it should cost if the contractor operates with reasonable economy and efficiency. That's where the term *should-cost* came from.

Should-cost is a concept, not a technique. How you reach a conclusion that the cost is reasonably attainable and reflects the best deal under the circumstances is not important. There is a relatively old concept in cost analysis that says you attempt to establish what it should, not what it will, cost to do a job. What is important is that the method you use results in a price based on what it should cost in the environment and under the conditions predicted for contract performance.

Suggested Readings

Cost-Based Prices

FAR	15.810	Should-cost analysis
DFARS	15.810	Should-Cost Analysis

Contract Cost Principles

DFARS	15.870	Procedures for Identifying Contrctors' Unallowable Costs
FAR	Part 31	Contract Cost Principles and Procedures
DFARS	Part 31	Contract Cost Principles and Procedures
FAR	42.8	Disallowance of Costs
DFARS	42.8	Disallowance of Costs

Contract Cost Analysis Defined

FAR	15.801	Definitions
	15.805-3	Cost analysis

Cost Accounting

DCAAM 7640.1	Defense Contract Audit Agency Manual

Davidson, Sidney, ed., Managerial Accounting: An Introduction to Concepts, Methods & Uses, Dryden Press, 1978.

Bulloch, James, ed., Accountants' Cost Handbook, New York: The Ronald Press Co., 1983.

Contract Pricing Proposals

FAR	15.804	Cost or pricing data
DFARS	15.804	Cost or Pricing Data

Cost Estimating

How to . . . Cost Estimating Manual; Harrison, Rounscival S.; Initial production in 1984 by the Lockheed Corporation. National Estimating Society may be a current source.

Cost Analysis

FAR	15.805-3	Cost analysis
	15.805-4	Technical analysis
DFARS	15.805-4	Technical Analysis
FAR	15.811	Estimating systems
DFARS	15.811	Estimating Systems
FAR	Part 30	Cost Accounting Standards
DFARS	Part 30	Cost Accounting Standards

CHAPTER 4
Profit Analysis

CHAPTER 4

PROFIT ANALYSIS

CONTENTS

4.1 Pricing Policy and Profit Objectives 4- 1

4.2 Introduction to Weighted Guidelines 4- 2

4.3 Contractor Effort 4- 4
  Material acquisition 4- 4
  Manufacturing, engineering, and services labor 4- 5
  Indirect costs 4- 6
  Other direct costs 4- 7
  Example 4- 7

4.4 Contractor Risk 4-11

4.5 Facilities Capital Employed 4-14

4.6 Special Factors 4-14
  Productivity 4-15
  Independent development 4-15
  Other factors 4-15

4.7 Documentation 4-19

4.8 Statutory Limitations 4-20

4.1 Pricing Policy and Profit Objectives

In this chapter, we look at basic ideas about prices and profits and discuss methods of developing the prenegotiation profit objective. Throughout this chapter, read *profit* to include fees under CPIF, CPFF, and CPAF arrangements as well as profits under fixed-price arrangements.

We have said it is basic pricing policy to rely on the marketplace to establish reasonable contract prices. If competition has established the price, the amount of profit accruing to the seller (the excess of income realized over costs incurred) will depend on the seller's ability to produce for costs at or below the contract price. In such a situation, we are not concerned with how much profit the seller makes at the offered price. The amount of profit will depend on the seller's ability to control costs.

In competitive markets, cost estimates and reports of cost analysis are unnecessary and improper. However, these cost review techniques are necessary and proper in those situations where the disciplines of the marketplace are absent. In these situations, the purpose of all analytical techniques is to establish conditions to simulate the marketplace and give approximately the same results.

In the absence of competition, profit policy is implemented by the use of weighted guidelines. This method of establishing profit objectives promises higher or lower profit depending on the skills and resources needed to perform the contract, the amount of cost risk assumed by the contractor, the facilities capital investment required, and other, special factors.

The goal of profit policy is to promote price negotiation practices that promote efficient performance. You must not establish profit objectives in such a way that a contractor can expect to receive the same profit percentage on contract after contract regardless of task, risk, or investment. Likewise, you must not set profit objectives at one level for fixed-price contracts and at another for cost-reimbursement contracts regardless of other factors. The weighted guidelines method differentiates among different situations and ties larger profits to outstanding performance of difficult tasks.

4.2 Introduction to Weighted Guidelines

The Federal Acquisition Regulation (FAR) requires agencies to use a structured approach for determining profit or fee objectives in acquisitions that require cost analysis. The DoD FAR Supplement (DFARS) establishes the weighted guidelines method as the structured approach to be used within DoD, with certain specified exceptions where other methods may be used.

The weights assigned to individual factors and analysis must comply with the values set out in DFARS, and the overall profit objective must promote the principal profit policy objectives to:

a. Reward contractors that take on the more difficult tasks requiring higher skills.

b. Encourage them to accept greater contract cost responsibility by establishing substantially different profit levels for different pricing arrangements and different cost-risk situations.

c. Encourage them to make cost-effective capital investments.

d. Encourage them to use nongovernment resources.

Special data are not needed to make weighted guidelines work. To establish profit objectives, you can and should use information generally available from the contractor's proposal or within your organization including field pricing and audit activities. Information adequate for cost analysis also will be adequate for profit analysis. The weighted guidelines method requires substantial judgment from you and encourages you to establish wide-ranging profit objectives. There are statutory limits on fees for CPFF contracts and price or estimated cost and fee for architect-engineer contracts, and administrative limits on fees for CPIF and CPAF contracts. However, no activity may impose administrative ceilings on profit.

The weighted guidelines method may cause profit objectives to vary significantly. This is consistent with its intent to provide the contractor that responds to the motivations of the system with opportunities for increased profits.

You are not expected to have measurable proof that weighted guidelines objectives are achieved. However, you should be able to point to indicators of that achievement. Contractors should be accepting contractual arrangements that carry higher cost-risk and making noticeable efforts to improve performance in areas that caused loss of profit increments. This could lead, for example, to greater investment in facilities.

We have stressed the importance of keeping the extent of pricing effort consistent with both the dollar value of the procurement and the return that reasonably can be expected. This same principle governs the use of weighted guidelines. The extent of profit analysis should be in proportion to the extent of the cost analysis necessary to establish a basis for negotiating a reasonable price.

One further caution is necessary. The weighted guidelines method is a technique for analyzing and evaluating profit, not for negotiation. When conditions make it worthwhile, you may discuss the evaluation factors considered in setting the profit objective, but you won't even attempt to reach agreement on the exact weights or values of the factors.

Even for pricing arrangements that require separate identification of profit, do not get a specific agreement on the factors involved in the profit evaluation or an agreement on the total profit dollars, apart from total cost. This is particularly important in incentive contracts, which require simultaneous agreement on the interrelated elements of target profit, target cost, share arrangement, and any mandatory limitations on profit or price that, taken together, make up the pricing arrangement. Don't be drawn into a piecemeal agreement on target cost, then target profit, share arrangement, and finally profit limits or price ceiling.

The evaluation of profit factors is done in two steps. The first step is to evaluate the contractor's effort. There is relatively detailed guidance on the weights to be assigned in this step. The second step is to evaluate the contractor's assumption of cost-risk, facilities investment risk, and special factors. In this step the assignment of profit weights requires a substantial amount of judgment and analytical skill.

You don't need to spend much time in the first step beyond what you spend to determine the realism of estimated costs; in any given case the possibility of a wide swing in composite rates is fairly remote. You should spend more effort, though still commensurate with the dollar value of the contract action, in the second step where judgment factors dominate and wide swings in profit weights are possible.

The weighted guidelines method is designed to help you come up with a profit objective that discriminates among procurement circumstances and contractors and encourages the contractor to strive for the highest level of performance. You should use the method for prospective price negotiations as well as in situations where the establishment of the profit objective has a retroactive effect. Examples are converting a letter contract, redetermining price retroactively, and negotiating change orders. You won't use this technique in negotiating CPAF arrangements, in converting estimated or target profits to final profits in incentive arrangements, or in settling terminations.

The weighted guidelines method, if applicable, will be used to develop a profit objective before negotiation of a contract change or modification. If the change or contract modification is for a relatively small dollar amount and involves essentially the same type of work required by the basic contract, use of the weighted guidelines method generally results in a profit objective similar to the profit objective in the basic contract. Therefore, this basic rate may be applied to the contract change or modification.

In cases where the change or modification calls for substantially different work, the contractor's effort and the final profit could be changed radically from that originally anticipated; you will need to make a detailed analysis. If the dollar amount of the change or contract modification is significant in comparison to the contract dollar amount, make a detailed analysis.

Also remember, in pricing changes to contracts where much of the work has been completed, that the contractor's risk has been reduced significantly. You should consider, for example, not only how much work has been completed, but whether the completed work involved routine or complex tasks, critical testing areas, or high-risk portions of the contract. You also should consider the date of the definitive proposal (if any) and the responsibility for any delay in reaching agreement on price.

Individual pricing actions may be grouped to determine a total profit objective. For example, in pricing a number of changes to the contract where the work required by each of the changes is similar, the total dollar amount of the changes may be grouped and a profit objective developed. Similarly, in pricing a large number of spare parts, you may consider the total dollars on the order in developing your profit objective. You must consider the relative stages of completion of work and the nature of the completed work in evaluating the cost risk present.

4.3 Contractor Effort

Analyzing contractor effort is the first step in profit analysis. You develop a composite weighting by evaluating the material and skills that will be needed to perform the contract and by measuring what the contractor will have to do to get the job done. This weighting is a by-product of cost analysis, the breaking down of the contractor's cost estimate to the detail needed to determine the realism of the projection and the need to expend the effort and monies. In coming up with the probable cost (what it probably should cost), you also can assign profit weights to the same cost efforts to complete this first step.

The profit objective should measure the extent and nature of the contractor's effort. A contractor that proposes to subcontract most of the contract effort and that does not provide technical or administrative assistance to the subcontractors would receive a lower composite profit weighting than a contractor that does most of the work in its own plant. However, a prime contractor's make-or-buy decisions, the extent of competitive subcontracting, and the administration of complex subcontracts are a part of the effort and must be weighted.

Therefore, this contractor effort factor is a measure of the quantity, character, and value of the labor and materials the contractor must use to make and deliver the product. It differentiates among highly skilled engineers who are designing an item and less critical draftsmen. It also differentiates the effort in buying parts off the shelf and in subcontracting for complicated items that require considerable engineering and technical liaison.

This first step assumes a direct relationship between the effort and the cost of that effort: the more cost, the more profit. At first glance, it would seem to reward the contractor that is able to incur costs and penalize the contractor that controls expenditures. This is not the case. Cost analysis is used to identify and trim costs that appear to result from ineffective management, thereby establishing a reasonable estimate of what the effort should cost. This pretty well eliminates the chance that you might reward a company for inefficiency.

Also, you can reward the contractor that has been doing a good job of controlling and reducing costs in the second step of the method, analysis of contractor risk. If the contractor has a record of effective cost control, you are more likely to consider a high-risk arrangement (FFP or FPIF) that carries a higher profit weighting. Further, to the extent that the cost record has contributed to outstanding performance or can be considered, in itself, to constitute outstanding performance, more weight can be added to that factor.

Material acquisition (subcontracted items, purchased parts, and other material)

Weight ranges for material are lower than the ranges for other costs because material represents the lowest investment of resources per sales dollar. Analysis of direct material costs will show variations in the managerial and technical effort needed to obtain the material. A direct material cost of $1 million could represent a single subcontract with an established source for standard material, or it could include several subcontracts that require the contractor to find suppliers to develop difficult items to complex performance specifications. Obviously, the amount of managerial and technical effort is much greater in the second case than in the first.

The contractor that obtains maximum competition in procuring direct materials exerts greater effort than the contractor that routinely places repeat orders with established vendors. Subcontracts for professional or consulting services should be assigned a weight commensurate with the management liaison involved.

The normal low weight for direct materials is 2 percent. A lesser weighting should be used only in unusual circumstances where the contractor makes only a minimum contribution. You might use a weighting of less than 2 percent, for instance, if the material represents a large part of the total contract costs, is a follow-on order with an existing vendor, and is to be shipped directly from the vendor to the Government.

You may need to treat tooling separately. For example, you might have assigned a weight of 2 percent to purchased parts but find that a significant portion represents tooling requiring careful selection of sources and constant liaison with suppliers. You might conclude that the portion of purchased parts representing tooling should carry a weight higher than 2 percent. Similarly, when tooling is a subcontract item, you may give it a weight different from that assigned to other subcontracts.

Indirect materials charged to the various burden pools should be assigned weights using the direct-material criteria and judgments.

Manufacturing, engineering, and services labor

Top management, notable scientific talent, and unusual or scarce engineering talent deserve the highest weightings, whether for manufacturing or research and development contracts. Scientific and engineering talent of the type contemplated will not be present in all contractor organizations, and the level of skills will vary among and within contractor organizations and contract situations.

There are two basic rules in assigning weights to the labor categories. First, all labor must be rated within minimum and maximum DFARS weights. For instance, all engineering labor must carry weights within the 9-to-15-percent range, and services labor must carry weights within ranges of 5-to-15-percent for direct labor and 4 to 8 percent for overhead. Second, except for services, labor carries the same weight whether it is classified as direct or indirect.

One way to arrive at an appropriate weight is to use the contractor's job designations to classify labor into the categories shown in Table 4-1.

TABLE 4-1

ENGINEERING	MANUFACTURING	ADMINISTRATIVE
Top scientist or engineer	Department head	Top management
Senior engineering or project manager	Supervisor	Executive assistants
Engineer	Engineer	Professional staff
Junior engineer	Skilled	Clerical
Draftsman	Semi-skilled	Support
Technical writer	Unskilled	
Clerical	Support	
Support		

Next, you might assign weights to the classes of labor. The assigned weights remain the same whether the salary cost represented by the job designation is treated as a direct or an indirect cost. You would determine the approximate dollar amounts attributable to salaries of personnel with these job designations and would multiply the amounts by the assigned weights.

Assignment by job designations is only one method of arriving at an appropriate weight assignment. Another is to find the total scale of labor rates within the labor pool of the contractor's organization, determine the average labor rate for the particular contract, and assign the weight that bears the same relationship to the DFARS range of weights that the average labor rate for the contract bears to the total scale of labor rates in the labor pool.

For example, if the scale of labor rates within the contractor's engineering organization is from $5 to $20 per hour, and the average engineering labor in the particular contract is $12 per hour, you could determine that $12 falls within the scale of $5 to $20 as 11.8 percent falls within the 9-to-15-percent range. As a result, you might assign a weight of 11.8 percent to the direct engineering labor input.

Another method, to use manufacturing labor as an example, is to determine that the average scale of manufacturing labor within a particular segment of industry is, say, between $4 and $9 per hour. A contractor within this segment of industry in a given area has proposed using labor with an average rate of $5.50 per hour. The $5.50 figure falls within the $4-to-$9 range in the same manner as 6.2 percent falls within the 5-to-9-percent range for manufacturing labor. Therefore, you could select the weight of 6.2 percent as appropriate to the manufacturing labor input.

Another way to evaluate the level and quality of labor efforts would be to examine an organizational group as a whole. For example, if a particular research group contributes significantly to the organization's costs and an analysis of the talent within this group indicates that its average composite weight is 12.5, all labor costs representing efforts of this group could then be assigned a weight of 12.5 percent.

Again, the amount of analysis performed should be commensurate with the dollars involved. You should assign specific weights for profit while analyzing the costs. Any method of determining weights is acceptable as long as you consider the comparative quality and level of talents, skills, and experience required.

Indirect costs

The appropriateness of weights for overhead costs depends on how much the indirect efforts contribute to contract performance. As stated before, labor costs in overhead are evaluated and weighted as if they were direct costs. Similarly, indirect material is weighted the same as direct material.

The contributions to contract performance of other types of costs such as depreciation, utilities, and maintenance are more difficult to assess. However, as an example, depreciation of modern production equipment, the use of which reduces total contract costs, should be assigned a higher weight than depreciation of older, slower, and less efficient equipment.

Using these guidelines, all expenses within the overhead pools would fall within the 1-to-15-percent range. Although individual weights necessarily are assigned outside the composite range for the total overhead pool, the final composite average must fall within the applicable range of 6 to 9 percent for engineering overhead, 4 to 7 percent for manufacturing overhead, 4 to 8 percent for services overhead, and 6 to 8 percent for general management expenses.

You should analyze the latest available breakdown of the overhead pool composite. This breakdown may be from the last audit period rather than the prospective period. Unless there is a substantial change in the composition of the pool, historical information is satisfactory.

You don't have to make a separate profit evaluation of overhead expenses for each procurement of substantially the same product from the same contractor. Once a weight has been assigned the overhead pool, that weight may be used until the cost composition of the overhead pool or the contract circumstances change.

Other direct costs

Proposals, particularly for research and development, often list as direct costs the kinds of expenses usually treated as indirect for other contracts. Examples are travel and subsistence, consultants, telephone, computer costs, and report reproduction. The accounting treatment of a cost category does not change the weight appropriate to the cost being evaluated.

The weight ranges in DFARS cover the broad categories of material, labor, overhead, and general management expenses for manufacturing, R&D, and service contracts. DFARS also recognizes that the formats of cost submissions may vary and stipulates that all cost categories will fall under one of the broad groupings. Because other direct costs are not direct material or direct labor, they usually will be considered as indirect costs for weighting purposes.

Example

The following example applies the procedures and philosophies concerning the contractor effort segment of weighted guidelines. In the example, the contractor has furnished a cost breakdown on a unit basis for an item that the company had developed at its own risk in anticipation of the requirement. It represents a modification of a similar device developed under an earlier Army contract. It is anticipated that the resultant pricing arrangement will be FFP. The cost estimate submitted and the Government cost objective, developed by cost analysis, are shown in Table 4-2.

TABLE 4-2

	CONTRACTOR	GOVERNMENT
Material	$1,300	$1,200
Manufacturing labor	1,125	925
Manufacturing overhead	2,025	1,625
Engineering labor	350	320
Engineering overhead	315	270
Factory cost	$5,115	$4,340
G&A	155	130
Total cost	$5,270	$4,470
Profit	(14%) 730	*
Unit price	$6,000	

*To be determined by weighted guidelines.

Table 4-3 shows the make-up of the $1,200 material cost estimated by the Government.

TABLE 4-3

Purchased parts	$ 350
Subcontracts	550
Other material	300
Total material	$1,200

Purchased parts include electronic components available from several sources. The quality and reliability of the parts is relatively critical. While taking advantage of the competitive market, the purchasing department must expend effort to select the best sources to secure timely delivery of parts of an acceptable quality.

The weight range for purchased parts is 1 to 4 percent. However, because 1 percent is used only in unusual circumstances, as noted earlier, the real choice is 2 to 4 percent. The purchasing action is more than just routine, but it does not require extensive technical and management participation. Therefore, a factor of 3 percent is reasonable.

Subcontracts represent reasonably complex electronic gear from two suppliers, one of which requires close follow-up by the prime to get deliveries on schedule. The items are made to the prime's design and, except for slight modification, have been produced previously by the subcontractors.

The weight range for subcontracted items is from 1 to 5 percent. Again, the real range of choice is between 2 and 5 percent. If these were standard items made to the supplier's design, the choice might be 2 percent. If the items required development and test, or if effort were required to develop suitable sources, a weight close to 5 percent might be appropriate. A factor of 3 percent is selected to give weight to the prime's design-control and follow-up efforts.

Other material is composed of raw materials and standard parts for which no special effort is required. A weight of 2 percent is assigned to this element. If the material had been forgings or alloys of special design or bar stock of some special alloy in short supply, a higher weight would have been in order.

These judgments translate into the following profit objective for direct material (Table 4-4).

TABLE 4-4

	ESTIMATED COST	ASSIGNED WEIGHT	PROFIT DOLLARS
Purchased parts	$350	3%	$11
Subcontracts	550	3	16
Other material	300	2	6
Weighted objective			$33

The Government estimate of $925 for direct labor cost is composed of tooling labor of $225 and manufacturing labor of $700. The tool designers and draftsmen are highly skilled and have proved the quality of their work on previous programs. The range is from 5 to 9 percent. You chose a factor on the high side of the scale for tooling, 8 percent.

Manufacturing labor breaks down roughly into 10 percent supervisory, 75 percent skilled, and 15 percent unskilled. You assigned the highest rate of 9 percent to supervisory, the median rate of 7 percent to skilled labor, and the lowest weight of 5 percent to unskilled, for overall weight of 6.9 percent for manufacturing labor.

If the mix of labor were different, there would be some change in the objective, but it would not be significant as long as the weights of 9, 7, and 5 percent were not changed. For example, if the skilled labor were dropped to 50 percent and the unskilled raised to 40 percent, the composite rate would change from 6.9 percent to 6.4 percent.

This selection of weights for factory labor gives the profit- objective dollars shown in Table 4-5.

TABLE 4-5

	ESTIMATED COST	ASSIGNED WEIGHT	PROFIT DOLLARS
Tooling	$225	8.0%	$18
Manufacturing	700	6.9	48
Weighted objective			$66

Your estimate for engineering labor cost is $320. The engineering is not of great complexity and does not require high-level talent. The range is from 9 to 15 percent. The median point of 12 percent is selected for the effort involved. The application of this weight results in a dollar profit objective of $38 (12 percent of $320).

Engineering and manufacturing overheads and general management expenses have weight ranges of 6 to 9 percent, 4 to 7 percent, and 6 to 8 percent, respectively. A weighted guidelines analysis of the burden pools had been done on a recent program, and no significant changes had occurred in the cost composition of the pools since that analysis. The weights are as shown in Tables 4-6, 4-7, and 4-8.

TABLE 4-6. ENGINEERING OVERHEAD

CATEGORY	TOTAL ESTIMATED OVERHEAD EXPENSES	ASSIGNED WEIGHT	PROFIT DOLLARS
Salaries and fringe benefits:			
Management	$ 200,000	13.0%	$ 26,000
Designers	800,000	10.0	80,000
Support & clerical	600,000	9.0	54,000
Outside purchases:			
Professional services	300,000	5.0	15,000
Rent & utilities	200,000	3.0	6,000
Supplies	50,000	2.0	1,000
Depreciation	1,300,000	6.0	78,000
Travel & subsistence	500,000	4.0	20,000
Taxes	50,000	2.0	1,000
Total	$4,000,000		$281,000
Composite weight		7.0%	

TABLE 4-7. MANUFACTURING OVERHEAD

CATEGORY	TOTAL ESTIMATED OVERHEAD EXPENSES	ASSIGNED WEIGHT	PROFIT DOLLARS
Salaries and fringe benefits:			
Management	$ 6,000,000	9.0%	$ 540,000
Support	6,500,000	7.0	455,000
Unskilled	2,000,000	5.0	100,000
Outside purchases:			
Professional services	1,000,000	5.0	50,000
Rent & utilities	1,000,000	3.0	30,000
Supplies	500,000	2.0	10,000
Depreciation	8,000,000	6.0	480,000
Travel & subsistence	1,500,000	4.0	60,000
Taxes	500,000	2.0	10,000
Total	$27,000,000		$1,735,000
Composite weight		6.4%	

TABLE 4-8. GENERAL MANAGEMENT EXPENSES

CATEGORY	TOTAL ESTIMATED OVERHEAD EXPENSES	ASSIGNED WEIGHT	PROFIT DOLLARS
Salaries and fringe benefits:			
Management	$1,100,000	13.0%	$173,000
Support	4,200,000	7.0	294,000
Unskilled	200,000	5.0	10,000
Outside purchases:			
Professional services	600,000	5.0	30,000
Rent & utilities	100,000	3.0	3,000
Supplies	700,000	2.0	14,000
Depreciation	200,000	8.0	16,000
Travel & subsistence	400,000	3.0	12,000
Taxes	500,000	2.0	10,000
Total	$8,000,000		$562,000
Composite weight		7.0%	

Conclusions are shown in Table 4-9.

TABLE 4-9

	ESTIMATED COST	ASSIGNED WEIGHT	PROFIT DOLLARS
Engineering overhead	$ 270	7.0%	$ 19
Manufacturing overhead	1,625	6.4	104
General management	130	7.0	9

As a result of this analysis, Table 4-10 is the preliminary Government unit price objective before adjustment for contractor risk, facilities investment, and special factors, and before evaluation of the realism of the resulting price.

TABLE 4-10

	ESTIMATED COST		ASSIGNED WEIGHT	PROFIT	
Material:					
Purchased	$350		3.0%	$11	
Subcontracted	550		3.0	16	
Other	300		2.0	6	
		$1,200			$ 33
Factory labor:					
Tooling	$225		8.0	$18	
Manufacturing	700		6.9	48	
		925			66
Manufacturing overhead		1,625	6.4		104
Engineering labor		320	12.0		38
Engineering overhead		270	7.0		19
Factory cost		$4,340	7.0		$260
General management		130			9
Total		$4,470	6.0		$269

A composite rate of 6 percent for contractor effort results from these calculations ($269 divided by $4,470).

4.4 Contractor Risk

The purposes of this factor are to discriminate among procurement situations for the cost risk a contractor assumes under the contract and to encourage the contractor to assume greater responsibility. This factor can be critical to reduction of costs. A contractor's ability to control and reduce costs depends on the extent to which it assumes, and the Government relinquishes, management and cost responsibilities under the contract and the extent to which the contractor is encouraged to avoid allowable but unnecessary costs.

The weights for cost risk are from 0 to 8 percent for manufacturing contracts, 0 to 7 percent for R&D contracts, and 0 to 4 percent for service contracts. The ranges were set up to permit the assignment of 0 when the contractor assumed minimal cost risks, as in the case of certain CPFF arrangements. There are two types of CPFF arrangements: completion and term (or level of effort). The level-of-effort type is cited as the minimum cost risk type; the weight assignment is 0. Because the completion type provides for performance and delivery of a specific end item, a weight of 1 percent could apply to it.

The weight for cost risk on CPFF arrangements generally will not exceed 0.5 percent. The weight of 8 percent might be in order when the contractor assumed maximum risk, as with a closely priced FFP contract for a difficult task.

The range of weights for the particular pricing arrangement, within this total 0-to-8-percent range, was set up to permit discrimination among the different arrangements in weighting for risk-taking. However, the weight ranges for each contract type do not constitute a range within which every procurement using that contract type must fit. For most procurements, these ranges will be appropriate. However, assignments above or below these individual normal ranges, but still within the total 0-to-8-percent range, are not prohibited when the risk analysis indicates that the normal range is not appropriate.

To understand the full implication of the contract cost risk factor, keep in mind that it encompasses two basic considerations. One is the responsibility for costs, that is, who pays for cost overruns. The second is how much risk of an overrun actually exists. The responsibility for costs is determined by the pricing arrangement, the share, and the fee swing for CPIF or the ceiling for FPI. Risk of overrun is determined by the difficulty of the contract task and the confidence in the cost estimate.

The following are the normal rates for various contract types, arranged by manufacturing, R&D, and service contracts:

a. Type of contract and percentage ranges for profit objectives developed using the manufacturing weighted guidelines method (see Table 4-11).

TABLE 4-11

Cost-plus-fixed-fee	0 to 0.5%
Cost-plus incentive-fee	
With cost incentives only	1 to 2%
With multiple incentives	1.5 to 3%
Fixed-price-incentive	
With cost incentives only	3 to 5%
With multiple incentives	4 to 6%
Prospective price redetermination	4 to 6%
Firm-fixed-price	6 to 8%

b. Type of contract and percentage ranges for profit objectives developed using the R&D ghted guidelines method (see Table 4-12).

TABLE 4-12

Cost-plus-fixed-fee	0 to 0.5%
Cost-plus-incentive-fee	
With cost incentives only	1 to 2%
With multiple incentives	1.5 to 3%
Fixed-price-incentive	
With cost incentives only	2 to 4%
With multiple incentives	3 to 5%
Prospective price redetermination	3 to 5%
Firm-fixed-price	5 to 7%

c. Type of contract and percentage ranges for profit objectives developed using the service contract weighted guidelines method (see Table 4-13).

TABLE 4-13

Cost-plus-fixed-fee	0 to 0.5%
Cost-plus-incentive-fee	1 to 2%
Fixed-price-incentive	2 to 3%
Firm-fixed-price	3 to 4%

In weighting for contract cost risk, first select the median of the range for the pricing arrangement and then, normally, adjust within this range for share, fee swing or price ceiling, confidence in the cost estimate, and difficulty of the contract task. You do this because the cost risk under a particular pricing arrangement varies in relation to the specific incentive factors, the realism of the price, and the challenges of the job, just as the pricing arrangement depends in part on the realism of the cost estimate.

The pricing arrangement is made up of several interrelated variables, including estimated cost, estimated profit, share, and contract ceiling price or profit limitations, whichever is appropriate. (In an FFP contract, the sharing arrangement is 0/100 and the fixed price is the ceiling.) To the extent that any of these elements varies from normal under the particular circumstances, the weight should be moved toward the upper or lower end of the suggested range for the particular contract type.

Another factor that can influence the weight you assign for cost risk is your confidence in the cost estimate. You are going through this exercise in order to come up with an evaluation of the cost risk the contractor would be accepting at different cost levels under the same arrangement as well as under different pricing arrangements. The greater the contractor's willingness to assume risk, the more you will add to the profit objective.

To get a more definite idea about confidence, you compare the contractor's estimate with yours. If you are confident that the final cost will approximate your estimate (within plus or minus 3 percent, for instance), and if the contractor is willing to contract on an FFP basis at a price reasonably close to yours, you can conclude that the contractor is willing to accept a high degree of cost responsibility.

On the other hand, if the contractor's estimate is 20 percent higher than yours and you are satisfied, after reexamination, that yours is realistic, you may conclude that the contractor is reluctant to accept cost risk. Your first weight assignment, based on your estimate, may indicate a high-risk situation, but this valuation may need to be modified during negotiations; the closer you must move to the contractor's proposal in order to settle, the lower the risk in the situation.

Consider another example. In this one you have decided, after analysis, that the final contract cost could reasonably be expected to be as much as 40 percent over the contractor's proposal or as much as 20 percent less. With this indicated lack of confidence, you are not willing to enter into a high-risk arrangement, and the contractor is probably at least as reluctant. Therefore, you may want to provide for less cost responsibility and to assign a relatively low weight. How low will depend on the arrangement you select for negotiation.

Confidence in an estimate is influenced by many things: the preciseness of the statement of work; the technological uncertainties; the availability of meaningful cost or pricing data; the period covered by the proposed contract; the adequacy of the estimating methods; the judgment and abilities of the estimators; and the decisions of management.

These factors also are elements to consider in analyzing the costs and in selecting a pricing arrangement. Therefore, much of the groundwork for evaluating contractor's acceptance of risk and for weighted guidelines application already has been done in the regular discharge of the pricing responsibility. Little extra effort is required.

When you firm up a letter contract, a contract change, or any other unpriced action where costs have been incurred, there is virtually no cost risk associated with the incurred costs. Therefore these incurred costs should be assigned a 0 risk weighting. Additionally, the "to go" portion (the estimate to complete) may entail less risk than if there were no incurred costs and could be assigned a weight outside the DFARS ranges. If the Government caused the late definitization of the letter contract, equity may require you to weight this circumstance in your profit objective.

4.5 Facilities Capital Employed

The purpose of this factor is to encourage contractor investment in new facilities and thereby reduce dependence on Government-furnished facilities. A weight of 16 to 20 percent is assigned to recognize the risk associated with facilities capital employed on the contract.

The base for this factor is net book value of facilities capital as determined on DD Form 1861, Contract Facilities Capital and Cost of Money. Several factors influence the weight you assign for facilities capital. New, productivity-enhancing facilities would be assigned a weight at the top of the 16-to-20-percent range, and older, slower, more general-purpose facilities would be assigned at the lower part of the range. Some specific factors to consider for facilities capital include:

a. Age of facilities.

b. Undepreciated value of the facilities.

c. The relationship between the remaining life of the facilities and the life of the contract.

d. Whether the facilities are general-purpose.

e. The cost effectiveness of the facilities employed.

Existing facilities would be assigned a weight in the 16-to-18-percent range because they do not represent any additional risk assumed by the contractor. Within the 16-to-18-percent range, you might assign a higher weight for special-purpose facilities that have usefulness remaining for the life of the contract.

New facilities are weighted in the 18-to-20-percent range because new investment in facilities means a greater assumption of risk by the contractor. When the additional factors are considered, you would give a higher weight to special-purpose facilities with long service lives. New facilities that are routine replacements of existing facilities would be given a lower weight.

4.6 Special Factors

The purpose of the special factors of productivity and independent development is to reward the contractor for unusual efforts. Only a few contracts have circumstances that warrant using these profit factors.

Productivity

As stated in the facilities capital section, the Government encourages contractor investment in facilities. However, new facilities that increase productivity should reduce costs, thereby reducing the profit base in contractor effort. This element of the weighted guidelines provides an opportunity to mitigate the contractor's profit loss. The productivity element can be used only under certain circumstances:

a. The acquisition must be a follow-on contract.

b. Actual cost data must be available to establish a baseline.

c. Changes in item configuration cannot be large enough to invalidate price comparability.

There is no weight range for productivity; the amount of the productivity award is based on the cost reduction due to productivity gains resulting from contractor investment. Quantification of productivity gains and allocation of profit must be reasonable for the contract effort involved.

Independent development

This factor provides a means for rewarding a contractor that assumes the extra risk of developing an item with military applications on its own initiative, without Government assistance. Profit weights in the range of 1 to 4 percent are normal for this factor. This special profit consideration can be assigned only when the contractor independently developed the item or its essential components and weights are applied to the costs associated with developing the item. If the item is 10 percent of the contract cost, the selected weight would be applied to that amount, not the total contract cost.

In evaluating this factor, determine whether the item involved was developed by the contractor without Government assistance and whether its purchase will result in some special benefit to the Government. Then analyze the nature and extent of Government support of the contractor's independent research and development program and the extent to which the contractor has already been compensated for risk assumption through prior sales of the identical item to the Government. In addition, the costs of developing the item may have been incurred in prior years. The fact that the costs have been incurred, but have not been recovered directly, should be considered in assigning weight to this factor.

Assigning a special profit consideration in the initial contract for prototype and test items may not be enough to encourage a contractor to continue with an independent development program. You generally should give weight for this special consideration in the contracts for production quantities until you decide that the contractor has been adequately rewarded for independent effort in developing the particular item. This determination can be made by balancing the extent and duration of cost risk assumed by the contractor in developing the item against the weighting of this factor in negotiations of prior contracts.

Other factors

Other factors include the contractor's efforts in support of (1) small and small disadvantaged business programs, (2) labor surplus area programs, and (3) energy conservation. Also included are special situations not provided for specifically elsewhere in the weighted guidelines. A composite weight within the range of -5 to +5 percent of the basic profit objective may be assigned for this element. Program participation rated as merely satisfactory should generally be assigned a weight of 0. Evidence of energetic support may justify a plus weight and poor support a negative weight.

Special situations may be assigned either a plus or minus weight depending on the particular circumstances.

Let's complete the example begun under contractor effort. The composite weight computed earlier for that factor was 6 percent. The job now is to assign weights for the below-the-line factors shown in Table 4-14.

TABLE 4-14

Contractor risk	0 to 8%
Facilities capital employed	16 to 20%
Special factors	
Productivity	No range
Independent development	1 to 4%
Other	- 5 to + 5%

You are considering an FFP arrangement with a definite development risk that may affect the production line and the efficiency of labor. You have estimated the costs to be $800 (15 percent) less than the costs proposed by the offeror. You therefore assign the highest weight of 8 percent for the contractor cost risk factor. If the basic premises upon which you have established your position should change, the 8-percent weight would no longer be appropriate.

The contractor has no Government-owned facilities at present and is not requesting any facilities or financing for this contract. The contractor is acquiring new equipment with greater capacity and greater operating speed. The company planned and designed the new equipment at its own expense, anticipating the Government's needs. A weight of 19 percent is assigned for facilities capital.

The contractor has introduced production methods which will reduce direct manufacturing labor markedly. The contractor's proposal includes estimated labor costs that are $375 lower than the actuals experienced just before the new methods were put into operation. Your analysis of the labor to be expended on the current contract led you to an estimate that is another $200 less than the contractor's or $575 below the actual. This $575 becomes $1,710 with the application of overhead and G&A expenses; that is, $1,710 less than the latest actuals.

This big reduction in estimated cost effectively reduces the base used to develop estimated profit dollars and, as a result, the opportunity for profit. To ease this profit loss, and to reward the contractor for innovation, you increase your profit objective by an amount equal to 7 percent or one-half of the profit rate included in the contractor's proposal. That weighting is reasonable considering the 19 percent weighting for facilities capital.

The company gives effective support to value engineering and to small business, small disadvantaged business, and labor surplus programs. Our assessment of the combination of these factors leads to assignment of a weight of 2 percent. We are concerned that the company has not retrenched as production has declined and that it continues to place significant subcontracts sole-source with sources selected on engineering evaluations alone. We will discuss these points during negotiations.

These several judgments are summarized in Table 4-15.

TABLE 4-15

Contractor's input to total performance	6.0%
Cost risk	8.0
Facilities capital employed	19.0
Productivity	7.0
Special factors	2.0

Computation of profit for cost risk, facilities capital, and special factors is somewhat complicated. You need to know the value of facilities capital applied to the contract ($440) and to remember that profit dollars for contractor's effort on manufacturing contracts are reduced by 30 percent. The following example on a DD Form 1547 picks up the earlier weighting for the contractor's efforts and completes the weighted guidelines analysis (see Figure 4-1).

For manufacturing contracts, you must reduce the profit of the contractor's effort by 30 percent to adjust for the addition of facilities capital as a profit factor. R&D and service contracts aren't subject to this adjustment. However, if cost of money is claimed on an R&D or service contract, the profit objective must be reduced dollar for dollar to offset the cost of money.

The tentative price objective is an FFP arrangement at a unit price of $5,233 against the contractor's proposal of $6,000 unit price. The two estimates supporting these positions are compared in Table 4-16.

TABLE 4-16

	CONTRACTOR	GOVERNMENT
Material	$1,300	$1,200
Manufacturing labor	1,125	925
Manufacturing overhead	2,025	1,625
Engineering labor	350	320
Engineering overhead	315	270
Factory cost	$5,115	$4,340
G&A	155	130
Total cost	$5,270	$4,470
Profit	(14%) 730	(17%) 763
Unit price	$6,000	$5,233

Two points need to be made. One, you can use other than whole percentages as weights. You can use fractions of percentage points in situations where judgments can be precise and use has a significant impact on the final result. Two, you apply weight factors against your cost objective dollars, not against the dollars estimated by the contractor.

Your job now is to review the analysis and the conclusions based on that analysis to be sure you are on sound ground. Your price objective of $5,233 is $767, or 13 percent below the company's offer. This suggests either misplaced confidence in your estimate or the likelihood that the negotiations will

FIGURE 4-1

WEIGHTED GUIDELINES PROFIT/FEE OBJECTIVE

1. CONTRACTOR IDENTIFICATION	a. COMPANY NAME J. B. King, Inc.		b. DIVISION NAME *(If any)*		
	c. STREET ADDRESS 2525 Dubarry Place	d. CITY Middleroad		e. STATE TN	f. ZIP CODE
2. WEIGHTED GUIDELINES CATEGORY *(Check one)* a. ☒ MANUFACTURING b. ☐ RESEARCH AND DEVELOPMENT c. ☐ SERVICES		3. TYPE OF CONTRACT *(Ref DAR, Sec III, Part 4)* FFP			
4. BASIC PROCUREMENT INSTRUMENT IDENTIFICATION NO.					5. SPIIN
a. PURCHASING OFFICE	b. FY	c. TY-PROC-INST-CODE	d. PRISN		

6. WEIGHTED GUIDELINES PROFIT FACTORS *(DAR 3-808.4)*

PROFIT/FEE FACTOR OR SUBFACTOR (a)	MEASUREMENT BASE (b)	PROFIT WEIGHT RANGES			ASSIGNED WEIGHT (%) (f)	PROFIT/FEE DOLLARS (g)
		MFG (%) (c)	R&D(%) (d)	SVCS(%) (e)		
PART I – CONTRACTOR EFFORT						
7. MATERIAL ACQUISITION						
a. SUBCONTRACTED ITEMS	$ 550	1 TO 5	1 TO 5	1 TO 5	3	$ 16
b. PURCHASED PARTS	350	1 TO 4	1 TO 4	1 TO 4	3	11
c. OTHER MATERIAL	300	1 TO 4	1 TO 4	1 TO 4	2	6
8. ENGINEERING						
a. DIRECT LABOR	320	9 TO 15	9 TO 15		12	38
b. OVERHEAD	270	6 TO 9	6 TO 9		7	19
9. MANUFACTURING						
a. DIRECT LABOR	925	5 TO 9	5 TO 9		7.1	66
b. OVERHEAD	1,625	4 TO 7	4 TO 7		6.4	104
10. SERVICES						
a. DIRECT LABOR	–			5 TO 15	–	–
b. OVERHEAD	–			4 TO 8	–	–
11. OTHER COSTS	–				–	–
12. GENERAL MGMT – G & A	130	6 TO 8	6 TO 8	6 TO 8	7	9
13. SUBTOTAL PROFIT/FEE						$269
14. LESS: ADJUSTMENT FACTOR		30				81
15. TOTAL EFFORT	$4,470					$188
PART II – CONTRACTOR RISK						
16. COST RISK	*(Total from Col b)* $4,470	0 TO 8	0 TO 7	0 TO 4	8	$358
PART III – FACILITIES INVESTMENT						
17. CAPITAL EMPLOYED	*(Line 8, DD Form 1861)* $440	16 TO 20			19	84
18. BASIC PROFIT/FEE OBJECTIVE *(Items 15 + 16 + 17, Col g)*						$630
PART IV – SPECIAL FACTORS						
19. SPECIAL PROFIT/FEE OBJ						
a. PRODUCTIVITY	$1,710				7	120
b. INDEPENDENT DEVELOPMENT		1 TO 4	1 TO 4		–	
c. OTHER	*(Total from Item 18)* $ 630	-5 TO +5	-5 TO +5	-5 TO +5	2	13
d. TOTAL SPECIAL PROFIT/FEE OBJECTIVE						
20. SUBTOTAL PROFIT/FEE OBJECTIVE *(Items 18 + 19d, col g)*						$763
PART V – COST OF MONEY OFFSET *(Applicable to Research and Development and Services Weighted Guidelines only.)*						
21. LESS: FACILITIES CAPITAL COST OF MONEY *(DAR 3-808.3(a)(1)(g))*						
22. TOTAL PROFIT/FEE OBJECTIVE *(Items 20 – 21, col g)*						$763

DD FORM 1 JAN 80 1547 PREVIOUS EDITIONS ARE OBSOLETE.

be strenuous. If a recheck discloses no significant area of weakness or uncertainty, the objective should stand. How you proceed during negotiations to attain that objective is treated in Chapter 8.

Before you leave this example, you may want to think about the comparison of percentages and dollars in the profit portion of the objective. The profit figure is higher in percent but lower in dollars than the one in the contractor's estimate.

No matter what combination is used in selecting weights for the contractor effort factor, the difference in the profit objectives is not going to be significant. Further, you can conclude that any significant swing in profit objectives that results from differing individual judgments will occur in the application of the below-the-line factors of risk.

One other thing. There could be other examples to show the use of weighted guidelines in R&D and service contracts. The net effect would be to reinforce what you already know. You know how to apply the guidelines in hypothetical instances. You know that a high-risk contract for a complicated piece of equipment representing a significant advance in knowledge and technology and requiring the time of top scientists, engineers, and craftsmen will claim the top profit-dollar objectives. Therefore, we will not include other examples. Your next move is to take the knowledge and apply it in actual procurements.

4.7 Documentation

The target profit objective must be documented in enough detail to explain the reasons for assigning the weights used. For example, if the contractor was given a weight of 4 percent for independent development, the documentation should support this conclusion.

The profit objective is a prenegotiation evaluation of the total estimated profit. It is developed after analysis of costs and development of a Government position on what it should cost to perform the contract. The profit objective is valid as a percentage and as an absolute number of dollars only when it is related to the Government cost position. Both cost and profit estimates are quite likely to change during negotiations as more facts become known or as it becomes necessary, in order to reach agreement, to offer a different contractual arrangement.

For example, assume the facts in Table 4-17, adding as many zeros to the figures as you feel will make the situation credible.

TABLE 4-17

	CONTRACTOR'S PROPOSAL		GOVERNMENT OBJECTIVE	
Firm-fixed-price		$150		$130
Estimated cost		$132		$113
Estimated profit	(13.6%)	18	(15%)	17

The 15-percent profit objective is valid in relation to the $113 that the contracting officer thinks it should cost to do the work. That cost estimate is based on the expectation that the labor hours will come down a 70 percent slope and that, because of quantities, the contractor should be able to buy the necessary material at prices 10 percent below the last purchase prices.

In negotiation, the contracting officer decides that, because of labor turnover and some redesign effort, the cost for the contract should be about $120. However, the company is not willing to contract at that level on an FFP basis. If the contracting officer revises the cost objective to $120 and the contract type to an FPI, neither the 15 percent nor the $17 remain good numbers. It should not be necessary to use weighted guidelines to recompute a profit figure. Some mental arithmetic should lead to a new number appropriate to the higher cost base, the possible reduction in expected efficiency, and the lessening of the cost risk.

From this we can state a general requirement. The reasons for all significant changes from the negotiation objective should be documented. Further, as a reminder, the extent of the justification should always be related to the effort. Long narratives and minute details are neither required nor desired.

4.8 Statutory Limitations

There are no legal limits on profits on fixed-price contracts and organizations are not to establish administrative limitations on fixed-price profits. However, the following limitations are imposed on cost-reimbursement contracts by 10 U.S.C. 2306(d) and 41 U.S.C. 254(b):

a. For experimental, developmental, or research work performed under a CPFF contract, 15 percent of estimated contract cost.

b. For A-E services for public works or facilities, the contract price or estimated cost and fee shall not exceed 6 percent of the estimated cost to construct the public work or utility, excluding fees.

c. For other CPFF contracts, the fee shall not exceed 10 percent of estimated contract cost.

The 15 and 10 percent limitations also shall apply to maximum fees on CPIF and CPAF contracts. However, deviations may be authorized for specific contracts.

Suggested Readings

FAR	Subpart 15.9	Profit
DFARS	Subpart 15.9	Profit

CHAPTER 5
How to Analyze Direct Costs

CHAPTER 5

HOW TO ANALYZE DIRECT COSTS

CONTENTS

5.1 Materials 5- 1
  Definitions 5- 2
  Estimating material costs. 5- 3
  Analyzing material estimates 5- 5
  Inventory pricing methods 5- 9
  Subcontract costs 5- 9
  Interorganizational transfers 5-10
  Material overhead 5-10
  Material cost breakdowns. 5-10
  Summary questions 5-27

5.2 Factory Labor 5-29
  Labor cost information 5-30
  Estimating labor costs 5-31
  Analyzing labor estimates 5-41
  Summary questions 5-44

5.3 Engineering Labor 5-46
  Engineering labor cost information 5-47
  Factors influencing the estimate 5-49
  Analyzing the estimate 5-51
  Graphic review. 5-53
  Summary questions 5-54

5.4 Tooling. 5-57
  Accounting treatment 5-57
  Estimating and analyzing tooling costs. 5-58

5.5 Other Costs 5-59
  Preproduction costs 5-59
  Cost information 5-60
  Evaluating other costs 5-65
  Federal excise taxes 5-65
  Royalties 5-66

5.1 Materials

This section defines the several kinds of direct materials, describes how a contractor may estimate these costs, discusses some techniques you can use to analyze them, and shows examples of the information you can expect to see supporting material costs in a pricing proposal. The section concludes with questions to ask yourself when you think you've done a complete analysis.

Definitions

Direct materials includes raw materials, purchased parts, and subcontracted items required to manufacture and assemble completed products. A direct material cost is the cost of material used in making a product and is directly associated with a change in the product. The amount of material cost should be big enough to warrant the cost of accounting for it as a direct cost. Some material costs may be treated as indirect, even though the material becomes a part of the final product. When materials are small in quantity and cost and are difficult to measure, they may be classified as indirect material costs, accounted for in an appropriate overhead account, and spread over many products.

Thus, materials should have three general characteristics if they are to be classified as direct costs: they should become part of the product; quantity and price should be significant; and measurement of quantity and cost should be relatively easy and inexpensive.

Raw materials includes raw and processed material in a form or state that requires further processing.

Subcontracted items are parts, components, assemblies, and services produced or performed by other than the prime contractor in accordance with the prime contractor's designs, specifications, or directions and applicable only to the prime contract.

Standard commercial items are those items of a class or kind that are regularly used for other than Government purposes and are sold or traded in the course of normal operations. Standard commercial items normally are fabricated by the prime contractor and stocked in inventory.

Interorganizational transfers are materials sold or transferred among a prime contractor's divisions, subsidiaries, or affiliates that are under a common control.

Purchased parts fall in two categories: standard commercial items fabricated by other than the prime contractor; and parts, components, and assemblies produced by others but not to the prime contractor's designs.

What a company calls direct material in a contract pricing proposal usually will depend on its accounting and estimating practices. The data a company uses to estimate direct material costs also will depend on those same practices. Much of what is included as direct material will have been purchased from outside sources, from suppliers, vendors, agents, distributors, manufacturers, and others. Some of the materials will have been produced in other plants, divisions, or organizations of the contractor.

Your job is to find out what is included in material cost and how the costs were estimated. You can expect to see the principal items within each material cost category listed to show known or anticipated sources, quantities, unit prices, and similar specifics. You will want to find out how material requirements were determined, how the quantities were computed and priced, and if and how estimated quantities and prices were adjusted.

You ask in the solicitation for the data you need to analyze the proposal. Subcontracted items, because of their value in relation to the total material cost, usually deserve special attention. You should require subcontractors' cost or pricing data as support for the value of certain subcontract items. If the subcontract is expected to exceed $1 million, or both $100,000 and 10 percent of the prime's price to you, the data should be furnished to the prime by the subcontractor and by the prime to you. You can require the prime to get and furnish a subcontractor's data on an item of lesser value if you need it to price the prime contract.

These specific limitations apply in the case of prospective subcontractors, before award has been made. There can be exceptions. If the chief of the purchasing office agrees, you can withdraw the requirement for data on specific subcontracts, reserve some subcontracts for future pricing, or make some other provision.

The requirements relating to subcontractor cost or pricing data point out areas where the prime will need data from prospective subcontractors to price the subcontract items in its proposal. If the prime has placed the subcontract by the time you are ready to negotiate the prime contract price, you may require subcontractor cost or pricing data for your evaluation. If the subcontract was placed as the result of competition, you may want data from the prime to make sure that there was effective competition, but you will not need the subcontractor's cost or pricing data.

Estimating material costs

The contractor may use a statistical approach, a grass roots approach, or some combination of both to estimate material costs.

The statistical approach may be used to estimate costs for research and developmental work on products that have not been made before. Table 5-1 illustrates one application of this approach to a product with the weight of 10,000 pounds.

TABLE 5-1

Raw stock (includes castings and forgings) (60%)	6,000 lbs @ $1.75	$10,500
A/N standards (7%)	700 lbs @ $3.25	2,275
Conractor-furnished equipment:		
Vendor designed (27%)	2,700 lbs @ $9.40	25,380
Contractor designed (6%)	600 lbs @ $7.75	4,650
Total material		$42,805

Statistics developed from prior projects must be used to evaluate this estimate. Table 5-2 covers similar equipment of similar density that required the same relative advance in the state of the art:

TABLE 5-2

	PROJECT 1		PROJECT 2	
	Percent	Per Pound	Percent	Per Pound
Raw stock	68%	$1.40	62%	$1.60
A/N standards	6	2.85	8	3.10
Contractor-furnished:				
Vendor designed	22	8.00	25	9.00
Contractor designed	4	7.05	5	7.45
	100%		100%	

Project 1 covered a two-year period ending five years ago. Project 2 was also a two-year effort which ended two years ago. We'll come back to this later in the section. The remaining discussion of material estimating concentrates on the grass roots approach you are most likely to encounter.

It should be fairly easy to estimate material costs for work that has been done before. The company should have a priced bill of materials that can be factored for increases and decreases caused by competition, changes in market conditions, changes in design, and variations in quantities. However, it may not be exactly the same work as done before. Engineering may not be completed and a priced bill of materials may not be available.

In such cases, estimates probably would be prepared from an outline drawing, a rough parts list, and a general description of the product. For most developmental efforts, estimates must be prepared from even less data, and the results may be little more than rough, order-of-magnitude figures.

Material planning estimators in the manufacturing department may prepare the material cost estimate working with project engineers. Working together, they may break down the engineers' description of the item into three categories: common units being made for current products; units similar to those made for current products, modified for complexity and for added, deleted, or changed parts; and unique items not made before that may be described as to size, shape, material content, constituent parts, quantities, and complexity in relation to some existing component.

Using this information, the estimator may price common units directly from historical records of actual costs or by modifying actual costs to give effect to price level changes. Similar units may be priced by factoring historical data for differences in complexity and parts. Unique units may be estimated by using the engineers' descriptions and drawing on past costs for similar components as well as cost estimating relationships and rules of thumb.

The estimator may make up a tentative bill of materials based upon the preliminary outline drawings provided by the engineering department. The bill of materials sets forth the quantity and price of each detailed part required for each component, subassembly, and final assembly. Costs for each material and part are estimated, and totals are collected for raw materials, purchased parts, and other categories.

Raw materials are estimated by comparison with similar pieces wherever possible. Where comparison is not possible, the weight or other measure is estimated for pricing. In most cases, the estimator is sufficiently familiar with the materials to price them without further assistance. If not, the estimator can obtain information from the purchasing department.

A final product must contain a basic minimum quantity of materials equal to the quantity required by the specifications. However, the actual quantity of the materials consumed in the production process will normally exceed the minimum quantity indicated in the specifications. The difference is primarily due to scrap generated through normal production processes. Scrap is unavoidable and occurs in cutting, trimming, punching, boring, and machining materials.

Spoilage and defective items also cause the quantity of material used to exceed the amount specified. Spoilage is distinguished from scrap because it is the direct result of mechanical or human error. Defective items are similar to spoiled items except they may be reworked into an acceptable product. Changes may also be made in specifications after parts and materials have been purchased, rendering the parts and materials obsolete. Obsolescence usually is an important consideration only when products are subject to developmental technology.

A contractor may allow for scrap and spoilage through an upward adjustment in the quantities of materials required, in the price, or in both. For example, if a contractor estimated a scrap and spoilage rate of 10 percent on an item that cost $1 per unit, the priced bill of materials may show 1,100 pieces of material at $1 or 1,000 pieces of material at $1.10. There is nothing wrong with either method because the overall effect is the same.

In some instances the company may fabricate or rework parts that are purchased to commercial specifications but are not entirely suited to the design. In the case of electronic items, consideration must be given to the high rejection rates incurred when it is necessary to purchase electronic items made to commercial specifications and to test them to a higher specification. The size of this factor is a function of the uniqueness and complexity of the item and the experience of the company with the same or similar items.

Purchased parts estimates usually are based upon the cost of similar parts purchased recently. These parts often may be priced from vendor catalogs. Even when the catalog does not show the particular part required, similar parts may be found that can be used as a basis for estimates. If necessary, the purchasing department may be asked to help estimate the cost of special or unusual parts. When costs are entirely uncertain and time permits, planning quotations may be obtained from potential suppliers.

Analyzing material estimates

Your analysis will vary with the methods used to estimate and display direct material costs. We'll discuss the analytical approaches to four methods:

a. A statistical estimate.

b. A priced bill of materials that purports to develop the average unit material costs for the procurement.

c. A priced bill of materials for a preceding item or lot, modified to develop an average estimate for the present procurement.

d. A projection of the average material cost per unit on a preceding lot or contract.

After discussing these four methods, we will talk about analysis of material costs and discuss inventory pricing, subcontract costs, interorganizational transfers, and material overhead.

Statistical Approach

A pure statistical estimate of material cost is not used very often and, as a result, little has been done to develop ways of evaluating statistical estimates. With this method, actual costs may vary substantially from the estimates. However, familiarity with the method and a recognition of its limitations will help you.

In statistical analysis, first get the information you need, then establish the degree of realism of the percentages and prices used in the current estimate and the whats and whys of departures from historical values.

At times, when estimates are prepared early in the project or before work is started on a development contract, a company may use percentages of direct labor to develop probable material costs. This simplest form of estimating is acceptable only when no other data exist.

In other situations, although material is estimated as a percentage of direct engineering or direct manufacturing cost, the project has progressed so that prices on some material items are included in the estimate. In this situation you need to identify any firm prices. If prices are subject to later revision, you must estimate what the final costs are likely to be. When a formula representing historical costs is used to estimate these material costs, an adjustment that incorporates known costs may be a duplication; any duplication may be eliminated.

On new procurements, if pricing takes place before a bill of materials is developed, an estimator may modify known costs on a similar prior project to fit the new situation. This method of estimating needs special scrutiny to see if historical costs were normal and no abnormal spoilage or obsolescence occurred. In addition, you need to review substitutions of material to be sure that estimators considered the substitutions, additions, and deletions.

Occasionally, when estimating follow-on procurements, a company may either modify or make a statistical projection of an original estimate to develop current estimated material costs. This method will perpetuate any substantial variance or errors in the original estimate. That is why actual costs should be used as a point of departure in estimating.

On a follow-on procurement, actual costs should be available from the earlier work. You should use them to evaluate the current estimate. You also should compare the actual unit costs with the earlier estimate and project the actual costs, taking into account such modifying factors as:

a. The nonrecurring nature of original design, tooling, rearrangement, excess spoilage, and other start-up costs.

b. Economic factors leading to increases or decreases in price.

c. Changes in production rates and quantities.

Priced Bill of Materials for the Procurement

You first determine if the bill of materials has the right quantities. Although a detailed review may not be necessary, a check of some higher dollar value items is required, particularly if you don't know how the company develops a bill of materials. For example, did the estimator assume the most efficient use of materials? The chief controllable element in the amount of materials used, once the design has been fixed, is the amount of scrap generated in the manufacturing process. You should investigate any substantial differences in the amount of material called for on the bill of materials.

The exact quantity of material in the finished product, which you can obtain from the specification, the project engineer, or by examining the article, gives you a basis for comparison. This comparison will show the scrap allowance and this can be examined for reasonableness. A percentage allowance (factor) may have been applied to each classification in the bill of materials, or an overall factor used. Under either method, are the percentages supported by actual costs of similar projects? A contractor should prove that any factors applied for spoilage or obsolescence represent reasonable expectations. Comparison with factors used by other companies can be a check on reasonableness.

The prices used in any bill of materials must be reviewed to assure that the costs should be incurred. Identify the source of prices used: stock records, purchase orders, quotations. Are the latest available prices used? What is the trend in a vendor's costs or prices? Have weighted average unit prices been used? On purchase orders subject to price revision, are prices likely to be reduced at the time of revision? Have target or ceiling prices been used in the bill of materials? (In most cases, targets, not ceilings, should be used.)

Have factors been used to cover item or across-the-board economic increases? If so, are the factors supported? Have the effects of increasing quantities been considered in establishing prices?

(Quantity may be increased by combining several listings of the same item within the bill of materials, or in anticipation of future spares requirements.)

Have cash and trade discounts been considered as credits to material? Are scrap, spoilage, and obsolescence factors reasonable for the particular product? How do they compare with experience of the company or the industry? Is there provision for credits resulting from scrap sales?

Normally, variances and their treatment are the main problems in analyzing individual parts prices based on standard costs. You need to ask some different questions. How are the standards set? Are they revised periodically, at least annually? How are variances determined and booked? Have variances been included in developing parts prices? How much? Is the anticipated variance reasonable in light of actual variances, changes to standards?

Priced Bill of Materials on a Preceding Item

Analysis requires not only review of the priced bill of materials as described above, but also a review of the additions and deletions used to bring the bill of materials up to date. You also should analyze the effect of changes in manufacturing methods, the extent or type of tooling, and the make-or-buy program.

A factor may have been added to the total bill of materials to cover potential price increases. The realism of this factor must be established. All known reductions in prices of items in the bill of materials should affect the estimate either on an item basis or in developing modifying factors. Actual or potential increases must be considered in developing an overall factor or in partially repricing a known bill of materials.

Projection of Average Unit Material Cost

When actual average unit material cost experience on a preceding lot or contract is the basis for estimating material requirements, the contractor may make a token reduction in cost. This gesture usually does not produce a sound estimate and you should evaluate the estimate thoroughly.

One way is to apply a learning curve to a known cost to project the future cost of material. In certain industries this can produce realistic estimates. Where possible, delete major subcontracts to develop a learning curve for a prime contractor's direct material costs, then develop separate cost curves for each major subcontract effort. Because of the nature and complexity of most large dollar value subcontracts, this segregation can provide greater estimating reliability.

The learning curve is applied exactly the same as it would be in projecting labor hours. Historical facts also must support the slope of the curve. Realistic estimates can be made if historical costs are normal costs, not affected by extraordinary conditions, and if the degree of slope of the curve is a normal expectation for the plant.

To determine the normality of the historical cost used as the base, review scrap, spoilage, obsolescence, changes in manufacturing, tooling, and make-or-buy, and refunds or price adjustments credited to material cost. The history of prior projects in the plant will establish the slope of the curve. In verifying that slope, adjust for changes and remember that in follow-on production the scrap, spoilage, and obsolescence should be reduced. Lower prices should result from eliminating start-up costs at vendors' plants or purchasing more economical quantities.

When learning curve analysis is used to evaluate a major subcontractor's direct manufacturing effort, remember that many of the subcontracted items may be those that are least subject to extensive changes and that require a lesser proportion of assembly time. As a result, when the subcontracted effort could be performed by the prime in-plant, these considerations should contribute to a lower starting point and a shallower slope on the curve than would be expected for a plot of total in-plant effort.

The prime contractor's documentation supporting source selection and a preaward survey of a prospective subcontractor may provide clues as to the realism of the proposal. Also, in reviewing prior experience with a particular subcontractor, a pricing pattern might emerge from a comparison of interim billings with periodic progress reports. If a subcontract provides for both target and ceiling prices, find out which the prime has used in developing the material cost estimate. Although it may seem prudent to use the ceiling because it represents the maximum the prime might have to pay, such an amount is excessive and makes it a no-risk situation.

Analytical Approach

The method of analysis generally relates closely to the method of estimating. This does not preclude testing one of these methods against another, nor does it condone a broad-gauged check when a detailed review is possible and appropriate. When actual costs are available, the most current actuals should be used.

However, use of prior and current actuals can be misleading unless the circumstances of the procurements are understood. The earlier procurement might have required only modification of shelf items. The order might have been placed on a crash basis with premium charges for quick delivery. The order might have allowed for the tooling and engineering needed to create the source. The first order might have been an experimental run using model shop facilities and hand labor. Even if the prior procurement was made after effective price competition, you must consider differences in quantity and production rate. When quantities differ, costs may vary. Larger purchases might qualify for volume and cash discounts.

No matter how the costs have been estimated, you must try to isolate and analyze the amounts of material required for the contract and the estimated prices for those quantities. The amount of material required can be assessed by examining the product. You can verify the amount from the prints, unless the item is too complex.

You can review and analyze the summary bill of materials to determine if the amount is appropriate and you may be able to compare it with prior bills of materials. You make a comparison with material estimates made in other proposals if the item is comparable in design and content. Differences in make-or-buy plans and differences in accounting methods and production experience will affect price.

You may make comparisons with the same contractor's actual costs or prior estimates. However, prior estimates measure only the contractor's consistency in estimating and do not verify whether the original estimate was acceptable or reliable. A review of prior estimates and actual costs compared to those estimates may give a pattern that will help you evaluate the present estimate.

In analyzing material costs, you may make comparisons with material prices quoted by competing suppliers or with prior quotations or historical costs. If a company always buys from the same source, the historical data may not be a satisfactory basis for projection. Knowledge of the latest market prices and material price trends should permit a better analysis of estimates.

You should adjust both estimated and final material costs. These adjustments include trade and cash discounts, refunds or rebates on materials returned or of lower quality, and scrap or salvage materials returned or sold. Adjustments for discounts may be taken from the gross invoice cost of material to determine a net invoice cost of material. Other adjustments are made to determine a final cost of material after the manufacturing process has been completed and all residue such as scrap is gathered and sold.

Inventory pricing methods

Material costs charged to a contract are affected by the method used to price inventory. Costs will vary with the method used and the current market conditions; the price charged to production may be higher or lower than the market price for the same item.

When materials are purchased specifically for and are identified with a contract or cost objective, the actual purchase cost should be charged to the contract. When materials are issued from stores, any generally recognized method of pricing the materials is acceptable if the method is consistently applied and the results are equitable.

The accounting treatment of inventories presents many problems in the assignment of costs to inventory, and it is often difficult to find the appropriate asset value of cost of goods sold. The three methods most frequently used are first-in, first-out (FIFO), last-in, first-out (LIFO), and weighted average.

Under FIFO, the oldest cost incurred is considered the first cost charged to production, and the latest costs are shown in the inventory valuation. Under LIFO, the most recent cost is charged to production and the oldest cost is shown in the inventory valuation. The weighted average cost is determined by dividing the total cost of all units available in the inventory by the number of units. The result is the average cost charged to both production and inventory valuation.

The inventory valuation method that a contractor uses can substantially affect the cost of materials used in a contract. Under LIFO, when prices are rising, the cost of materials charged to production more nearly approximates the replacement value of the inventory than it does under FIFO. Conversely, under the same conditions FIFO would produce a value lower than the replacement cost of the inventory.

The effects of price fluctuations are not completely eliminated by the weighted average method. In periods of rising prices the contractor charges less to the cost of production; during declining prices the charge is more than the prices in the marketplace.

If inventory is priced using standard costs, you need to learn how the contractor will handle variances from those standards. Standard cost, plus or minus the variance, should approximate the figure determined by using weighted average costs.

Subcontract costs

The prime contractor or higher-tier subcontractor is responsible for analysis of subcontract costs. However, you are responsible for the total price paid to the prime and you have to be sure the prime has analyzed the subcontract proposal and negotiated an acceptable price. The prime must submit subcontractor cost or pricing data with its proposal, under stated circumstances, and must include an evaluation of the subcontractor proposals to which these data relate.

The Government may review the prime's evaluations in the field or the procurement office, or both. The point is that the reviews must be made and they should be made before the prime contract negotiations are completed. If you are not satisfied with the prime's evaluation, you can ask that the prime redo it, or you can ask the cognizant ACO and auditor to review it for you.

When you are ready to reach agreement with the prime on the contract price, you should be satisfied that the prices for both actual and potential subcontracts are reasonable. This does not mean that the prime must contract with all indicated subcontractors; it can, for good reason, contract with other sources at different prices. However, at the time you agree with the prime on price you will have evaluated the subcontract estimates in the prime's proposal and may have made provision for taking a later look at specific subcontract prices.

Interorganizational transfers

Interorganizational sales or transfers of material should ordinarily be handled on a cost, no-profit basis to the transferor. The transaction may be made at a price when it is the established practice of the transferring entity to price interorganizational transfers of commercial work at other than cost and the price (1) is or is based on an established catalog or market price of a commercial item sold in substantial quantities to the general public or (2) is the result of adequate price competition.

In the latter case, it must be the price at which award was made to the affiliated entity after obtaining proposals on an equal basis from that entity and one or more outside sources capable of producing the item. In either case, the price cannot exceed the most favored customer price and the contracting officer cannot have found the price to be unreasonable. In any case, treatment should be in accordance with acquisition regulations and agreed to with the contractor.

Material overhead

The priced bill of materials is not necessarily the total material cost incurred on a contract, even though the various discounts and allowances have been taken. There are related material costs that are in essence a material overhead; these are material handling costs and are logically a part of the total material cost.

Material handling costs include transportation in, purchasing expenses, receiving and inspection costs, storage costs, issuing to production costs, and in-transit insurance premiums. There are at least three methods for recovering these costs and your analytical technique should fit the contractor's treatment of these costs:

a. When material handling costs are identified with specific items and quantities of materials, they are charged to the product.

b. When it is difficult to identify these costs with specific items or materials, they may be treated as material overhead and allocated to the items that initially created the charge.

c. Most material handling costs may be budgeted and charged as a part of manufacturing overhead. However, costs such as purchasing and quality assurance may be included in G&A instead of manufacturing overhead.

Material cost breakdowns

The following examples illustrate the kinds of data you can expect to find in a proposal if submission and identification conform to the requirements spelled out in acquisition regulations. The examples are not necessarily typical; they are only illustrative.

Among the examples of the six categories of material, you will find questions you might ask about one or more of the data packages in the examples. The questions, like the examples to which they are addressed, are neither typical nor complete; they merely suggest lines of inquiry open to you. What you actually do in any particular case depends on what you see, what you already know, and above all, the facts of the case.

The company will submit its pricing proposal using an SF 1411. FAR Table 15-2 instructs an offeror, for materials, to "Provide a consolidated priced summary of individual material quantities included in the various tasks, orders, or contract line items being proposed and the basis for pricing (vendor quotes, invoice prices, etc.)." It identifies and describes six categories of materials, (1) subcontracted items, (2) standard commercial items, (3) interorganizational transfer (at other than cost), (4) raw material, (5) purchased parts, and (6) interorganizational transfer (at cost).

Subcontracted Items

Many subcontracted items are ones the prime, with plant capacity or necessary equipment might have made, or ones the prime decided to buy from someone who could do it for less. In any event, the prime knows what's needed, knows that it's not available off the shelf, and knows that it won't be built in-house. In this circumstance, the prime hires someone to do the job. Your task is to find out how the prime priced these items or estimated their cost. FAR Table 15-2 says this about subcontracted items:

> Include parts, components, assemblies, and services to be produced or performed by others in accordance with offeror's design, specifications, or direction and that are applicable only to the prime contract. For each subcontract over $100,000, the support should provide a listing by source, item, quantity, price, type of subcontract, degree of competition, and basis for establishing source and reasonableness of price as well as the results of review and evaluation of subcontract proposals when required by FAR 15.806.

Example 1 is a fairly complete illustration of an adequate identification for a simple procurement that answers four questions: (1) What is it? (2) Where is it? (3) What does it represent? (4) How was it used?

Example 1 – Subcontracted Items

The following Table 5-3 is taken from the cost estimate supporting the proposal. The column headings are those specified in FAR Table 15-2.

TABLE 5-3

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Subcontracted items	$395,520.84	–	Schedule A

The offeror's submission, as shown in the reference column in Table 5-3, includes a schedule of subcontracted materials, reproduced here as Schedule A.

SCHEDULE A
(See Bill of Materials 1523, 26 June 19X2)

PART NO.	NOMENCLATURE	QUANTITY PER ITEM	SCRAP FACTOR* (%)	TOTAL QUANTITY	UNIT PRICE	TOTAL
9876543	Housing casting. (Vendor – Pic Corp. PO 351522, ussued 12/20 to lowest of three proposals.)	1	4	468	$ 84.72	$ 39,648.96
9876542	Bearing, X design. (Vendor – Sun Co. PO 351480, issued 12/5 to only qualified source. Cost analysis performed.)	2	4	936	14.89	13,937.04
9876541	Gear, 14-tooth. (Vendor – Autoco. Two proposals. Autoco's the lower and its price used here. Bid file BB 442.)	4	4	1,872	4.18	7,824.96
9876540	Cable assembly. (Vendor – Rockaway Corp. Only proposal received. Completed 1411 attached.)	1	4	468	328.00	153,504.00
9876539	Bracket, main. (Vendor – Cee Cee Corp. Bracket is same as that used on earlier model of this system. Prior price was $22.19 each. (PO 341110) 8% added in making estimate, two years since last buy.)	3	4	1,404	23.97	33,653.88
9876538	Race assembly. (Similar assembly bought 5/25 from Hup, Inc. for $150 each. Engineering estimates P/N 9876538 will cost 1/3 more to make.)	1	4	468	200.00	93,600.00
9876537	Solenoid. (Engineer estimate (estimate file – Eng-47).)	1	4	468	90.00	42,120.00
9876536	Gear, drive. (Engineer estimate, review of drawing (estimate file – Eng-487).)	1	4	468	24.00	11,232.00
	TOTAL MATERIAL					$395,520.84

This example does not fit a major system procurement where the subcontracts are of the kind and size that require cost or pricing data in as much detail as the prime contract itself. When you can anticipate that need, put the requirement in the solicitation.

Some questions:

a. Is the make-or-buy program firm?

b. Does the subcontractor's SF 1411 for the cable assembly look okay? What price is the prime likely to negotiate for that item? Would that price be okay?

c. Why will the race assembly cost one-third more? Is there any chance it will be made in-plant?

d. What do you know about the prime's cost analysis on the bearing?

Example 2 – Subcontracted Items

Your analysis may be slightly different if the offeror proposes to subcontract for services necessary to contract performance. The following Table 5-4 is extracted from the detailed cost estimate for a contract for management of an arsenal where the offeror plans to subcontract the washing and repair of windows. The column headings are those specified in FAR Table 15-2.

TABLE 5-4

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Subcontracted items	$65,000	–	Exhibit A

The offeror's submission, as shown in the reference column of Table 5-4, includes an exhibit supporting the estimated $65,000 subcontract cost. This is reproduced here as Exhibit A.

EXHIBIT A

ITEM	VENDOR	PRICE	
		Unit	Total
Window washing. (Wash each of 20,000 windows twice a year. Three sources solicited, one responded. See bid file1423.)	EZ Maintenance Co.	$1.50	$60,000
Window repair. (Experience indicates 1,000 windows will need repair during year. Hart Hardware and Graf Hardware were solicited and bid same price. Hart is located adjacent to the arsenal and has given good service in the past.)	Hart Hardware	5.00	5,000

Two questions:

a. What's in the unit price of $1.50 besides labor? What did the offeror pay last year?

b. How good a number is the 1,000 windows? What does the experience show?

Standard Commercial Items

FAR Table 15-2 instructs an offeror to "Provide an appropriate explanation of the basis for pricing . . . ." Standard commercial items are ones the offeror normally fabricates, in whole or in part, and that are generally stocked for inventory. Commercial items are supplies regularly used for other than Government purposes and sold or traded to the general public in the course of normal business operations. Cost or pricing data are not required if the contracting officer determines that prices are based on established catalog or market prices of commercial items sold in substantial quantities to the general public.

Standard commercial items are like purchased parts except that the prime contractor makes them. As a result, you must verify that they are commercial items, sold in substantial quantities to the general public, and that the prices are in line with the prices of similar products in the commercial market. Table 5-5 and Exhibit A of Example 3 answer the four basic questions.

Example 3 – Standard Commercial Items

The following Table 5-5 is taken from the cost estimate supporting the proposal. The column headings are those specified in FAR Table 15-2.

TABLE 5-5

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Standard commercial items	$2,373.12	–	Exhibit A

The offeror's submission, as shown in the reference column of Table 5-5, includes an exhibit supporting the $2,373.12 estimate for standard commercial items. This is reproduced here as Exhibit A.

EXHIBIT A

PART NO.	DESCRIPTION	UNIT PRICE	QUANTITY	TOTAL PRICE
7176418	Bearing, roller	$3.14	206	$ 646.84
7468129	Shield, reflective	4.03	206	830.18
7843126	Bearing, ball	2.16	206	444.96
7843139	Case, bearing	1.03	206	212.18
7843146	Case, bearing	1.16	206	238.96
			TOTAL	$2,373.12

Prices were obtained from our commercial sales catalog, revised 29 Nov X2. These items are sold in substantial quantities to the general public and the sales volume may be verified by records of sales maintained in our sales department. For access to sales volume information and acquisition of a copy of our commercial sales catalog, please contact Mr. J. Waite, 561-8844, extension 819. The unit quantities per end-item were obtained from Ordnance Drawing 8164283-Rev. G. The quantity of each part was multiplied by 206, the total number of end-items being procured plus a 1 percent spoilage and loss factor. This 1 percent factor was developed through experience and historical data for a similar contract during the eight months ended 31 Dec X2.

Two questions:

a. What do the sales records show? Are these all commercial items?

b. Is there an SF 1412 in the data package? Should there be?

Interorganizational Transfers (at other than cost)

FAR Table 15-2 says, for this category of material, "Explain pricing method used (see FAR 31.205-26)." This is a very special category that requires specific identification of certain transfers of parts or services between segments of the prime contractor's organization. These parts may or may not be standard commercial items of the transferring division.

There should be an advance understanding of what items will be included in this area. The principal purpose of this segment is to have the offeror present the transfers for your consideration, and not necessarily your acceptance. It is important that the pricing method used be set out clearly.

Example 4 – Interorganizational Transfers

The following Table 5-6 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 5-6

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Interorganizational transfers (at other than cost)	$50,000	$50	Note 1

The offeror's submission as shown in the reference column of Table 5-6, includes a note supporting the $50,000 transfer. This is reproduced here as Note 1.

Note 1

Costs represent 1,000 thermo-cycles, part number ZB3-830, at $50 each manufactured at our Azusa plant. Part ZB3-829, a similar item, is manufactured from copper wire and sold to the public for $25 each. The silver wire used for the -830 part is twice as expensive to buy and fabricate. Our sales department can supply you Catalog 34 showing the part and Mr. Arthur Burette can supply gross sales information. Mr. Jeff Price, Engineering Research Department, can supply studies made to show a complexity comparison. See B/M #1236 for part requirements and quantities.

Two questions:

a. How similar are parts 830 and 829? Is the silver wire the only difference?

b. Even if silver costs twice as much as copper, should the price for 830 be twice that for 829?

Example 5 – Interorganizational Transfers

The following Table 5-7 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

The offeror's submission, as shown in the reference column of Table 5-7, includes a note supporting the $24,000 transfer. This is reproduced here as Note 3.

TABLE 5-7

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Interorganizational transfers (at other than cost)	$24,000	-	Note 3

Note 3

Cost of $24,000 represents 110,000 pounds of crude rubber from our Akron plant priced at 20 cents per pound. This is our normal purchase price (per Wall Street Journal, April 16, 19X3) plus 10 percent to cover certain handling charges and investment costs. The rubber will be processed at the Washington plant for use as cushion blocks. See B/M #1237 for part requirements and quantities.

Two questions:

a. Is the 20 cents per pound the current market price?

b. Is the 10 percent handling charge justified?

Example 6 – Interorganizational Transfers

The following Table 5-8 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 5-8

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Interorganizational transfers (at other than cost)	$94,000	$2.00	Note 2

The submission, as shown in the reference column of Table 5-8, includes a note supporting the $94,000 transfer. This is reproduced here as Note 2.

Note 2

Costs of $94,000 is for 47,000 beep blocks manufactured by our Dallas plant. The blocks are used in the nose cone indicator ballast. By advance agreement, these have been priced using a formula (referred to as the Dallas plant formula) agreed to and reviewed periodically by DCAS and DCAA representatives in Dallas. The $94,000 represents the application of the formula agreed to for 19X2. This agreement was signed by Mr. Kirk Patrick of DCAS and Mr. Pat Frederick of our Accounting Department on December 23, 19X1. See B/M #1238 for part requirements and quantities.

Two questions:

a. What is the formula? Has it been applied correctly?

b. Has the contractor tested the market?

Raw Material

This class of material should be easy to recognize and identify. Like purchased parts, it may be similar to the kinds of things you buy for your own use. The instructions in Table 15-2 say raw material ". . . consists of material in a form or state that requires further processing. Provide priced quantities of items required for the proposal."

Two examples illustrate how to be sure all the questions have been answered. As a caution, general words like "based on experience factor" and "based on the lowest of three bids" are not good enough unless some identification is provided about where the bids are located or what the timeframe for the actual costs really is.

Example 7 – Raw Material

Table 5-9 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 5-9

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Raw material	$124,422.45	$1.037	Exhibit 1

The offeror's submission, as shown in the reference column of Table 5-9, includes $124,422,45 raw material estimate. This is reproduced here as Exhibit 1.

EXHIBIT 1 – RAW MATERIAL

	TOTAL POUNDS REQUIRED	PRICE PER POUND	TOTAL COST
Material A	10,190	$0.500	$ 5,095.00
Material B	15,060	1.250	18,825.00
Material C	760	.420	319.20
Material D	67,800	.630	42,714.00
Material E	42,750	.087	3,719.25
Material F	25,000	.150	3,750.00
Material G	50,000	1.000	50,000.00
		TOTAL COST	$124,422.45
		Unit cost based on 120,000 cases	$1.037

(1) Raw material poundage is calculated by adding 8,000 samples to the 120,000 cases to be delivered. The 8,000 is a combination of the 1,000 samples specified in the RFQ plus rejects. Reject factor is based on rejects experienced on the preceding contract (Engineering study, File Eng 143.2). Table 5-9A shows this calculation.

TABLE 5-9A

	POUNDS FOR 128,000 CASES*	SCRAPPAGE 2%*	HANDLING LOSS 10%*	TOTAL
Material A	9,098	182	910	10,190
Material B	13,446	269	1,345	15,000
Material C	745	15	–	760
Material D	60,536	1,210	6,054	67,800
Material E	41,912	838	–	42,750
Material F	22,321	447	2,232	25,000
Material G	44,643	893	4,464	50,000

*Based on experience factors derived from predecessor contract. (Engineering study – File Eng-143.2.)

(2) Derivation of prices per pound is as follows:

a. Material A. Unit price is based on using same supplier as predecessor contract (XYZ Company). Previous competitor declined to quote on this limited quantity. Price is FOB Trenton, New Jersey. Price shown is same as previous buy on PO 83421.

b. Material B. Two quotes received. Award contemplated to other than low bidder. Low bidder's price is $1.215 per pound, but could not meet delivery requirements to support Government delivery schedule stipulated in request for quotation. The second low bidder's price is firm FOB Trenton, New Jersey and he is currently completing deliveries under predecessor contract. This supplier can meet the required delivery schedule. Past record of deliveries is excellent. (Bid Evaluation File PB 432.)

c. Material C. Unit price based on using same supplier as predecessor contract. No competition obtained for this limited quantity. (Prior PO 82134, SUZZ Company.)

d. Material D. Solicited four suppliers, two quotes received. Used unit price offered by low bidder. (Bid Evaluation file PB-666.)

e. Material E and F. Unit price based on using same suppliers as predecessor contract. No competition obtained in view of the small dollar amounts involved. (Prior POs 82135, SUZZ Company; 82136, GEMT, Inc.)

f. Material G. This item will be supplied by the Cleveland Division of the APEX Corporation. Quotations were solicited from other known producers of this item. All declined to quote. This item is a commercial product of this corporation and is sold in substantial quantities on the commercial market. The price offered is 15 percent lower than indicated in their commercial catalogs and is 5 percent lower than the most favored customer price. (Bid Evaluation File PB-1001.)

Some questions:

a. How long ago was the last buy of material A? What were the quantities?

b. Is the delivery requirement firm? Any chance of change so as to buy from low offeror on material B?

c. What did the other source for material D quote? How much higher was it? Did the prime negotiate or does he plan to negotiate with the low bidder?

d. Did the prime verify the subcontractor's claims on catalog and most favored customer prices for material G? What did he find out?

e. Does the prime have material left over from the predecessor contract? How about the supplier?

Example 8 – Raw Material

Table 5-10 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 5-10

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Raw material	$3,457,495.12	$23.05	Exhibit A

The offeror's submission, as shown in the reference column of Table 5-10, includes an exhibit supporting the $3,457,495.12 raw material estimate. This is reproduced here as Exhibit A.

EXHIBIT A – RAW MATERIAL

MATERIAL	FEET PER UNIT[1]	UNITS REQUIRED[2]	TOTAL FEET	COST PER CFT[3]	TOTAL COST
Steel tubing	5.05	150,000	757,500	$465.75	$3,528,056.25
				Less 2% discount	70,561.13
				TOTAL	$3,457,495.12
				Unit cost (150,000 units)	$ 23.05

[1] This estimate was developed from specifications and includes a 1 percent scrap factor.

[2] The RFQ calls for 149,900 units; 100 additional units have been estimated for samples and rejects.

[3] Cost is based on current purchase price from Jones Steel Co. presently supplying tubing for contract AF-1823.

Some questions:

a. Do the specifications bear out the five feet per unit requirement? What is the justification for the scrap factor?

b. What is the purchase price the cost is based on? What are the quantities?

c. What is the 2 percent discount? Is it reasonable?

d. Aren't rejects already included in the scrap factor?

e. Would tubing of a different grade and quantity, with a lower price, be acceptable?

Purchased Parts

Because purchased parts are similar to items you might buy for your own use, the four basic questions on completeness that you need to answer should be familiar. FAR Table 15-2 says that purchased parts include material items not covered in the other categories and instructs offeror to provide priced quantities required for the proposal.

Example 9 – Purchased Parts

What is it? "The cost of four tires on each vehicle per specification."

Where is it? "In a letter from the Apex Tire Company located in file cabinet number 1."

What does it represent? "Their latest quote dated 2 Jan X8 covering the quantity needed to fulfill the contract and meet the specification. Other quotes from Bex and Cex are also there but these are higher."

How was it used? "The quoted unit price was multiplied by the quantity required and the total shown as purchased parts. The discount for cash has been reflected in overhead. In addition, my last year's experience showed that my workers ruined one out of 100 tires during installation, so a 1 percent scrap factor has been added."

While simple, this example conveys the idea.

Some questions:

a. Does the contractor buy tires in quantity? If not, why not? Does it buy periodically, quarterly, annually, or within some other set timeframes?

b. Was last year's scrap rate normal? Was it really 1 percent? What should it be?

These questions are starters only. The answers will lead to other more specific questions until you are satisfied that you know all you need to know about the cost. In actual cases, the number of questions and the depth of analysis will be dictated by materiality, the number of dollars, the availability of resources, and the facts of the procurement.

Example 10 – Purchased Parts

Table 5-11 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 5-11

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Purchased parts	$5,547.58	$27.20	Schedule A

The offeror's submission, as shown in the reference column of Table 5-11, includes a schedule supporting the $5,547.58 purchased parts estimate. This is reproduced here as Schedule A.

SCHEDULE A – PURCHASED PARTS

PART NUMBER	DESCRIPTION	UNIT PRICE	QUANTITY	TOTAL PRICE	VENDOR	DATE OF QUOTE
11026904-71	Plate, ident.	$ .32	412	$ 131.84	Able	12/2/X3
11026184-18	Program tape	8.56	412	3,526.72	Baker	12/4/X3
10630246-1	Plate, designation	.44	206	90.64	Chas	12/6/X3
11027522-1	Plate, marking blank	.06	206	12.36	Dog	12/2/X3
11026141-23	Spool, metal	8.55	206	1,761.30	Eve	12/3/X3
MS20604-83K2	Rivet, blind	.03	824	24.72	Flo	12/1/X3
	TOTAL			$5,547.58		

Part numbers and quantities required per end-item were obtained from Ordnance Drawing 8164287, Rev. G. Prices are the lowest quoted in response to our competitive solicitation XYZ 6419 dated 11/8/X3. Quantities per end-item were multiplied by the total number of end-items (204) and a 1 percent spoilage and loss factor was added to make the number 206. The 1 percent factor was developed through experience and historical data on similar parts during the first half of 19X3 (see Engineering Study 1243). Prices quoted may be verified from vendor quotes on file in building 4, room 6, file cabinet 4, drawer 3 and are in the custody of Mr. John Sparks. Request to see these quotes should be made directly to Mr. Sparks, telephone 561-8844, extension 816.

Some questions:

a. Is the basis of the estimate consistent with the contractor's cost accounting practices?

b. Have the purchase orders been placed yet? At what prices?

c. Are any of these parts in inventory? How is inventory priced?

d. Is the 1 percent factor any good?

Example 11 – Purchased Parts

Table 5-12 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 5-12

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Purchased Parts	$94,507	–	Attachment 1

The offeror's submission, as shown in the reference column in Table 5-12, includes an attachment supporting the $94,507 purchased parts estimate. This is reproduced here as Attachment 1.

Attachment 1 - Purchased Parts:

There are 25 parts in this category totaling $94,507. Prices of 11 (worth $76,317) were established by competition. Two are shown below in Table 5-12A and the others are on file:

TABLE 5-12A

PART	DESCRIPTION	QUANTITY	VENDOR	PRICE	
				Unit	Total
7176418	Bearing, roller	15,000	Styx Bone*	$3.14 2.95	$47,100 44,250
7196481	Bearing	10,000	Bryx Stone*	1.00 .80	10,000 8,000

*Awarded purchase order.

Adjusted historical prices were used for seven of the parts with a total value of $14,915. The historical prices were adjusted upward by 5 percent to reflect my estimate of the general increases in material prices in the 17 months since the last buys. Three parts worth $13,960 are shown in Table 5-12B and the rest are in the file:

TABLE 5-12B

PART	VENDOR	LAST BUY			CURRENT PROPOSAL	
		Date	Quantity	Price	Quantity	Estimated Cost
746819	Gill Co.	Dec X1	3,000	$3.90	2,500	$4.10
753813	Mira	Dec X1	3,000	1.10	2,500	1.16
575981	Muir	Dec X1	500	1.03	750	1.08

The remaining seven parts with a total value of $3,275 were costed on the basis of engineering estimates. Details of these, and all other parts, are on file (GX8-7531.7) located in the office of the sales manager. The quantities for all parts are identified on our Bill of Materials #1234 dated 6/18/X2.

Some questions:

a. Where did the 5 percent come from? What really happened to prices of these kinds of material?

b. What's his track record on engineering estimates?

c. Have you talked to other team members about the bill of materials? Did they give you any leads?

Interorganizational Transfer at Cost

The instruction in FAR Table 15-2 for this category of material is to "Include separate breakdown of cost by element."

This block will show a single amount that represents the cost of items or services transferred from a separate organization of the offeror. The costs are just that, costs transferred. The separate breakdown of cost can be included in many ways. One way would be to include a separate SF 1411 as support for the cost included in this block. However, just having the contractor submit an SF 1411 with a supporting breakdown would not be enough. You will need identification of the factual data and estimates used.

A contractor may elect to use its own format to report and explain the nature of the transferred cost. Quite often the costs transferred can be explained easily this way.

The following are examples of what you might see as support for interdivisional transfers at cost when a contractor uses its own format.

Because of the less than arm's-length relationships between two components of the same company, you need to analyze these interdivisional transfers in the same manner as you do the prime's own cost.

Example 12 – Interorganizational Transfer at Cost

Table 5-13 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 5-13

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Interorganizational transfer at cost	$59,400	–	Note 3

The offeror's submission, as shown in the reference column in Table 5-13, includes a note supporting the $59,400 transfer at cost. This is reproduced here as Note 3.

Note 3

Costs in this block are estimated engineering services transferred from our Research Division, Pohasset, NJ, which will perform all design and drafting for the wingett section of the aft deck. Cost summary (Table 5-13A) is as follows:

TABLE 5-13A

Direct labor 1000 hrs @ $19.00	$19,000
Indirect expenses 1000 hrs @ $35.00	35,000
Subtotal	$54,000
Pohasset G&A 10%	5,400
Total transfer	59,400

Hours have been estimated jointly by Mr. Ray Freshly of this division and Mr. Fred Nash of the Research Division and are included in their report of January 26, 19X2 addressed to the Estimating Department (see Fuel- Wingett 1234). The labor rate is the current weighted average rate of Grade 5 engineers/draftsman in the Research Division. Indirect expenses are the actual rates experienced by that division during 19X1 and used for this proposal, in accordance with the accounting system being followed. G&A expense rate for the Research Division is the current rate agreed to with the local DCAS office for 19X2 work and can be found in the memorandum of understanding from the ACO, Mr. George Smiley, to the division manager on December 24, 19X1, which was accepted by acknowledgement dated January 15, 19X2.

Two questions:

a. What is the basis for the 1000 hours?

b. The estimate uses current actuals for direct labor and indirect costs. Why no forecasts?

Example 13 – Interorganizational Transfers at Cost

Table 5-14 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 5-14

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Interorganizational transfer at cost	$242,025	–	Note 3

The offeror's submission, as shown in the reference column of Table 5-14, includes a note supporting the $242,025 transfer at cost. This is reproduced here as Note 3.

Note 3

Costs in this block represent the assembly of part TBX 136824-2 by our Copro division. All parts will be transferred to the Copro division by this division at no cost, assembled, and returned for final assembly. Only fasteners, solder, and similar bench stock items, all normally included in indirect expenses, will be added by the Copro division. The cost breakdown (Table 5-14A) is as follows:

TABLE 5-14A

Direct labor 10,000 hrs @ $16.50	$ 65,000
Indirect expense (250%)	162,500
Material handling (10% of material value)	3,000
Total	$230,500
G&A (Copro division) 5%	11,525
Total cost transfer	$242,025

Assembly hours represent twice the number of hours experienced on the prior contract which was for half the quantity of this contract (see Job Order 19X1-1234). The direct labor rate is 4 percent higher than the average experienced rate on the prior contract due to a wage increase agreed to with the assembler union on January 6, 19X2 (see contract dated January 12, 19X2). Indirect expenses represent the current experienced rate of Department 495, Copro division during February 19X2. Material handling rate is the 19X1 rate of the Copro division applied to the value of the parts ($30,000) received at no cost by the division but considered in the base for allocation of this indirect expense (in accordance with our normal accounting system). The G&A rate is the average 19X1 rate of the Copro division applied to total costs. Job Order 19X3-976 has been assigned by the Copro division to this order and Mr. T. B. Fyre, Comptroller, can provide cost history information. The parts and their value used in the assembly can be obtained from Mr. Fred Hopkins, estimating department of this division, and are referred to as ED case X2-597.

Two questions:

a. Has the prime deleted the assembly hours from its labor estimate?

b. Is the straight-line projection of assembly hours okay?

Example 14 – Interorganizational Transfers at Cost

Table 5-15 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 5-15

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Interorganizational transfer at cost	$211,050	–	Note 3

The offeror's submission, as shown in the reference column in Table 5-15, includes a note supporting the $211,050 transfer. This is reproduced here as Note 3.

Note 3

Costs in this block represent the costs associated with hangar space transferred from our Commercial Flight Division for use of one half of hangar 3. This space will be used for testing purposes during the last nine months of 19X2. The testing requirement is included as item 6 of the classified work statement in the RFQ. The Commercial Flight Division normally allocates all cost on a basis of square feet of hangar space used for specific job orders. Job Order X2-997 has been assigned for this work. During 19X1 a total expense of $2,167,198 was incurred by the Commercial Flight Division. Hangar 3 represents one-fifth of the total space and therefore received a proration of $433,439. The master planning schedule indicates that hangars will be occupied 80 percent of the time by chargeable jobs. Hangar 3 has 100,000 square feet. It has been budgeted that Hangar 3 allocation for 19X2 will be $450,000. Our computation (Table 5-15A) for the cost is as follows:

TABLE 5-15A

Square feet	100,000	
Months	x 12	
	1,200,000	
Usage (percent)	x .80	
Useful occupancy	960,000	
Monthly sq. ft. cost	($450,000 ÷ 960,000)	= $0.469
Contract usage:	50,000 sq. ft. x 9 months	= 450,000
	450,000 x $0.469	= $211,050

The details of indirect expense data for 19X1 can be found in the expense ledger in the Financial Department. The budgeted data can be found in the Commercial Flight Division master budget. Please contact Mr. Philip Bangtol, Comptroller, for the information.

Questions:

a. What do you know about the reasons for only 80 percent occupancy?

b. Should you be charged for idle space?

Summary questions

The following are questions you should ask yourself when you think you have finished your analysis of direct material costs:

a. What shrinkage factors are used? How are they applied? Can data support them? Has the resale of scrap been considered?

b. Is a material learning curve used? Is it documented? Is it acceptable?

c. Is a make-or-buy program required? Is it complete? Do you agree with all the contractor's recommendations? Which, if any, do you disagree with? Why?

d. Is there adequate competition among outside suppliers? Have you or has someone else looked at all competitive quotes?

e. Has someone reviewed the prime's analysis of subcontract proposals? Did you have subcontractor cost or pricing data where required?

f. Considering storage and handling costs, has the contractor planned to take full advantage of price breaks in material purchases? Considering storage, handling, and shrinkage, are the contractor's production lot sizes economical?

g. Do you know the material unit prices recommended by field analysis? Based on your observations of the contractor's make-or-buy plan, lot size, and vendor selections, do you feel the suggested unit prices should be adjusted?

h. Are the costs for standard commercial items consistent with market prices and has guidance on determining items sold to the general public been properly applied?

i. Has the contractor proposed interdivisional transfers at other than cost? If so, is the price the established catalog or market price of a standard commercial item or is it a price reflecting effective competition? For all interdivisional transfers, do the originating and contracting divisions use common overhead and G&A accounts? If so, is the Government being double-charged?

j. Has the contractor proposed use of nonstandard parts? Why? Are the costs reasonable? Has an engineer looked into this? What were the reactions and why?

k. Are any material costs charged to more than one of the following: the overhead account; a special proratable account; or a direct cost account? Are the material overhead rates reasonable?

l. Have you developed conclusions for all direct material costs?

m. Would it be cost effective to check some more?

n. Are you really satisfied?

5.2 Factory Labor

Although subject to some differences in practice, direct factory labor generally can be associated directly with the product. It usually produces a change in the material, can be readily identified with the product, and will be large enough to merit identification and measurement. Most of the factory labor estimate is for fabrication and assembly of the end product. However, quality control labor may be included.

Fabrication is the fashioning of parts from raw material. This includes machine shop operations like sawing, perforating, drilling, punching, and cutting. It also may include welding, normally an assembly operation, if it takes place in or near the machine shop.

Most large plants have separate areas for assembling parts, subassemblies, assemblies, and subsystems. Unlike fabrication, assembly usually takes place in steps coming one after another on a line. In electronics, assembly is usually the process by which components are manually inserted into, or attached to, other components. Inserting a transistor would be an assembly operation within the process of assembling a printed circuit board.

Quality control labor is the effort of setting up and tearing down inspection and test stations and carrying out the inspections and tests specified by quality assurance engineers. Some contractors estimate quality control time jointly with quality assurance time and count them both as engineering time. Others consider quality control labor to be direct factory labor and estimate it in much the same way as they estimate other direct factory labor.

Before discussing how to evaluate direct factory labor, let's identify the kinds of labor that are ordinarily classified as indirect. Indirect factory labor usually includes foremen, superintendents, maintenance, and stockroom personnel. Some labor, like quality control (inspection) falls between direct and indirect functions, and differences in treatment are found within individual concerns, within industries, and among various industries.

Before there were cost accounting standards, there was a tendency to reclassify types of factory labor from indirect to direct and back again. Inspection is an example. This resulted partly from Government concern over high overhead rates.

Reclassification from indirect to direct is certain to send overhead downward because it has the double effect of reducing the overhead expense and increasing the base that carries the expense. Such an action now might require an amendment to the disclosure statement and a cost impact statement from a company required to comply with the rules, regulations, and standards promulgated by the Cost Accounting Standards Board.

Seemingly extraneous types of labor like engineering, tooling, planning, estimating, and expediting may appear in one company's manufacturing overhead and be treated as direct costs by another company and included in bases for overhead allocation. Still another company may handle these as indirect costs and charge them into other indirect expense pools. There is no consistent pattern among companies.

No matter which classification is used, it should be consistently applied within the particular contract and to all contracts in the plant. If changes in classification have been made, these changes must be considered when comparing present and future costs with those of prior periods. Also, you should recognize the existence of different practices and make adjustments before comparing one contractor with another.

Labor cost information

Labor cost is made up of two elements, the time it takes to do a job and the price the company must pay to buy that increment of a worker's time. In this section we are concerned with the time element; the price of labor is covered in Chapter 7.

The examples which follow are keyed to FAR Table 15-2 which says, regarding this cost element, "Direct Labor -- Provide a time-phased (e.g., monthly, quarterly, etc.) breakdown of labor hours, rates, and cost by appropriate category, and furnish bases for estimates."

This instruction applies to all kinds of labor, including both direct engineering and direct factory labor. The kinds of data that you require the offeror to submit or identify will depend on the way the offeror accumulates and estimates hours and on the task to be performed. As an example, a proposal for follow-on production under a lot cost system generally will differ from a proposal for new production under a standard cost system. Therefore, cost or pricing data requirements have to be determined for each individual proposal.

Direct factory labor may include such functional labor classifications as fabrication, assembly, tool manufacturing and maintenance, inspection, and plant engineering. For each type of labor proposed, you may need historical data as a starting point in evaluating the reasonableness of the proposed labor hours, but the data submitted are not restricted to data on like or similar tasks.

For example, if the contractor proposes assembly labor based on a learning curve, you may need historical data on several unrelated production contracts to establish the likelihood that the contractor will affect improvements or learning in assembly tasks. A more specific example follows, including Tables 5-16, 5-16A, and 5-16B.

Example 15 – Direct Factory Labor

Table 5-16 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 5-16

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Direct factory labor	$2,013,550	$20,136	Attachment 6

The offeror's submission as shown in the reference column in Table 5-16, includes an attachment supporting the $2,013,550 direct factory labor estimate. This is reproduced here as Attachment 6.

Attachment 6

Total hours by contract task and type of effort (Table 5-16A):

TABLE 5-16A

TASK	MACHINE	ASSEMBLY	TEST	TOTAL
1	140,000	120,000	11,200	271,200
2	60,000	25,000	1,000	86,000
3	25,000	12,000	500	37,500
TOTAL HOURS	225,000	157,000	12,700	394,700

Computation of costs (Table 5-16B):

TABLE 5-16B

	HOURS	LABOR RATE	TOTAL COST
Machine	225,000	$5.10	$1,147,500
Assembly	157,000	4.95	777,150
Test	12,700	7.00	88,900
	394,700	$5.10	$2,013,500

Task 1 factory labor hours are based on the attached learning curve which was developed from actual manufacturing labor hours required for contract -0375. The "T1" was based on detailed engineering estimates available in the engineering department. A curve of 83 percent has been estimated for Task 1 as compared to the 80 percent curve experienced on contract -0375. The 3 point difference in slope is due to the higher tolerances required in the machining operation on Task 1.

Factory labor hours for contract -0375 are part of the payroll tabulation runs which are identified by contract number and are summarized in the cost ledger in the cost accounting department. Tasks 2 and 3 factory labor hours are based on the actual hours experienced in manufacturing model A4J. The 80 percent learning curve attached reflects the actual hours for the first production of A4J in 19X4. Manufacturing hours experienced in 19X5 and 19X6 are not considered appropriate for comparisons as they do not include the costs of the initial start-up.

In addition, because of the large quantity manufactured, 19X6 reflects only a 90 percent learning curve. Factory labor hours for the A4J are identified in the 19X4, 19X5, and 19X6 payroll tabulation runs and are summarized in the cost ledger in the cost accounting department.

The proposed labor rates are based on the actual average labor rates for the functional labor classifications in Departments 230, 20, and 281 as shown in the monthly labor distribution tab run, dated 31 October 19X6. The actual rates were increased by 3 percent to cover the average yearly growth (19X4 through 19X6) in all of the manufacturing department's average labor rates. Since the period of performance is anticipated to be one year, a full year's growth factor was applied.

Estimating labor costs

This discussion assumes a procurement of production hardware and focuses on the elemental, grassroots approach to estimating. Many contractors estimate direct factory labor time by estimating the time required for every direct factory labor process or operation needed to fulfill the contract.

They may use either history, labor standards, or a combination of the two. A contractor's choice should coincide with its cost accounting practices.

Impact of Cost Accounting Systems

Job order cost systems are ones in which the contractor accounts for output by specifically identifiable physical units. The costs for each contract normally will be accumulated under separate job orders. A job order may cover the production of one unit or a number of identical units. If the contract is for just one unit, the entire actual cost of the unit is accumulated under the job order. An example might be a contract for one large ship.

When the contract is for items that are both complex and costly, the total quantity may be broken down into smaller production lots and the job order for the total contract may be supported by a separate job order for each lot. For example, if the contract is for five nuclear submarines, five separate lots may be established to accumulate the actual cost of each submarine. The use of lots permits the contractor to establish better control over the work, and the historical cost data from a series of lots lend themselves to a projection of estimated costs for future production. If the contract is for a limited number of units that are neither very complex nor costly, the costs of all units may be accumulated under one job order without any further breakdown by lots.

Experience with the product normally determines the number of units for which costs are to be accumulated. For example, a contract for 100 units of an item that has never been produced may have 10 separate lots under the job order. Four years and thousands of units later, the costs for a quantity of 100 units may be accumulated under the contract job order without any further breakdown by lot.

Because the physical units of production under a job order cost system are identified with specific job orders and lots, the labor distribution and accumulation system used by the contractor will identify the direct factory labor cost associated with the units produced under such job orders and lots. When a job order or a lot thereunder is completed, the supporting data will identify all persons who worked on the items produced, how much time they expended, and what their rates of pay were. It will yield total labor cost with subtotals and breakdowns by types of labor.

Process cost systems are used by contractors who continuously manufacture a particular end-item, like aircraft engines or chemicals for which there is a repetition of identical or highly similar processes. A process is one part of a complete set of activities that an item must pass through during manufacture. The completed item results from a series of processes, each of which produces some change in the material. The number of processes involved will vary with the complexity of the item. The greater the similarity between two end-items, the more likely they are to go through the same process, at the same time, with factory laborers devoting a part of their time to each item.

Under a process cost system, direct costs are charged to a process even though end-items (which may not be identical) for more than one contract are being run through the process at the same time. At the end of the cost accounting period (usually one month), the costs incurred for that process are assigned to the units completed during the period and to the incomplete units still in process.

A number of methods are used to assign costs. If there is only one end-item in the process, the contractor may add the costs incurred during the accounting period to the cost of the beginning work-in-process inventory and subtract the estimated cost of the ending work-in-process inventory to arrive at the total cost of items completed. Unit cost is determined by dividing the total cost by the number of units completed. If more than one item is in the process, the contractor may use standard costs and, at the end of the accounting period, multiply the standard cost for each item by the number of units completed to arrive at a total cost. Variances from standard can be accounted for and assigned to end-items in a number of different ways.

Normally an item will go through more than one process. When an item comes out of one process and enters another, its cost from the process just completed will be charged to the next process, usually as material cost. This continues until the completed end-item emerges from its last process.

Under a process cost system you may identify which factory employees charged their time to which processes, what their rates of pay were, and the total cost charged to the process. Unlike a job order cost system, you cannot determine the actual labor cost for specific end-items that have gone through a process. However, you generally can add standard cost and a factor for variances and arrive at an acceptably close approximation. Similarly, you cannot determine the actual labor cost for specific end-items that have completed all processes because cost elements lose their identity when they are charged to the next process as material costs.

Time standards, although they usually are based on industrial engineering efforts, may be based on past performance. Contractors using standards can and do call at least some of their data "historical data." The major distinction may be that historical data usually are thought of as raw accounts of past events, and standard-related data as having been translated into factors and allowances.

Contractors using the job order cost system may develop standards for certain operations or processes, especially ones they perform regularly. Furthermore, for some estimates, contractors using the process cost system can decide not to spend money on the industrial engineering efforts needed to develop standards and instead base their estimates solely on historical data.

Historical Costs

Actual time is a record of the time it took to perform some specific task, operation, or process in the past. If a task, operation, or process performed for a past contract is required for a contract under negotiation and the file includes a reliable record of actual time, the contractor may use that actual time to estimate labor costs. Learning curves are an application of actual time. To be used without modification, an actual time must be reasonable, demonstrably accurate, and recorded for work done under conditions nearly identical to those expected for the effort being estimated.

When estimating the cost of an item that is slightly different from an item produced before, the contractor may apply factors to the cost data to adjust it to the likely effects of the difference in time and costs. This estimate usually is based on engineers' judgment and may be given a name like "plant condition factor," "manufacturing allowance," or "complexity factor."

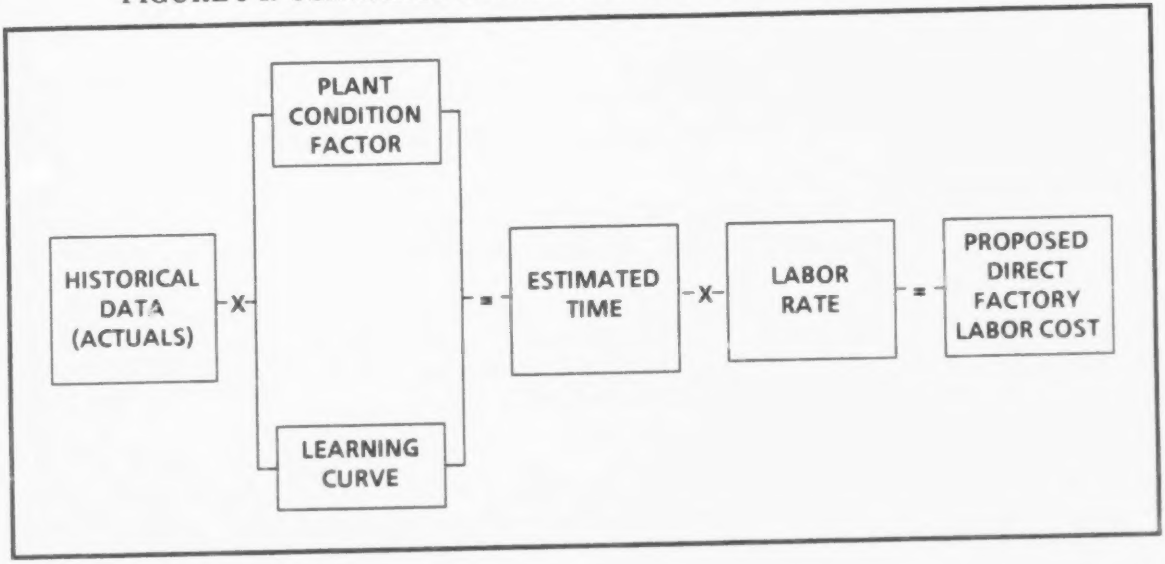
Figure 5-1 depicts how labor costs may be estimated from historical data.

Labor Standards

Contracts generally are awarded to manufacturers who have demonstrated that they can produce particular kinds of products. Even when the item has not been produced before, the contractor usually will have made similar products. Many of the required operations will be similar or identical to operations performed repeatedly in the past.

As a consequence, most contractors use labor standards and maintain a labor standards program. A labor standards program is a file of labor standards the contractor has developed, standard-related data accumulated from within the organization, labor standards developed by other companies, and standard-related data from other sources. (Standards quoted by a contractor

FIGURE 5-1. USING HISTORICAL DATA TO ESTIMATE LABOR COST



generally are company standards and not universally used by industry. Company standards may be considered proprietary information and not for use by other companies.)

A labor standard can be expressed as an output standard or as a time standard. An output standard specifies a production rate for a given unit produced by a given production method. "Two components (less soldering) mounted per minute" is an output standard. A time standard is the amount of time to produce one unit or complete one operation. "Thirty seconds to mount one component (less soldering)" is a time standard.

Labor standards, outputs, standard outputs, time standards, and standard times are terms that are used interchangeably and mean the same thing: the rate of production an average worker should be able to achieve under normal conditions.

Standard time is the time necessary for a qualified workman, working at a pace ordinarily used, under capable supervision, and experiencing normal fatigue and delays, to do a defined amount of work of specified quality when following the prescribed method. It also is normal or leveled time plus allowance for personal needs, fatigue, and delays (PF&D).

The contractor does not necessarily propose standard time. Frequently, standard time cannot be achieved until production has been underway for some time. Most estimates are, in effect, standard time plus time allowed for below-standard worker performance due to inexperience and other factors. You might ask the offeror why substandard performance exists and why it is not counterbalanced by above-standard performance as experience is gained.

Standard times may be developed and used within the shop. Many departments use some standard-related data and standards from other sources. To illustrate how standard times are developed, we will (1) assume the contractor is accumulating data within a department to develop standard times for that department and (2) use this formula:

Leveled time	+	Personal, fatigue and delay allowance (PF&D)	+	Special allowance	=	Standard time
(a)		(b)		(c)		

Leveled time is the time that a worker of average skill, making an average effort under average conditions, normally spends on a specific operation or process. It does not contain allowances of any type. The three most commonly used techniques for determining the leveled time for an operation are time study, predetermined leveled time, and work sampling.

Time study involves subdividing work cycles (operations or tasks) into elements that consist of distinct, describable, and measurable fundamental motions. In a turret lathe operation, for example, elements could be "get stud from table and place in chuck," "tighten chuck with socket wrench," or "start machine."

The elements are listed on a time study sheet in the sequence in which they are performed. The person conducting the study makes one of several continuous observations of the work cycle, makes stopwatch timings of each element, and records them on the time study sheet. The observer also records the skill and effort displayed by the worker, the conditions under which the work is performed, and how much consistency is attained for the kind of work being done. The time recorded represents performance time, not leveled time. (Figure 5-2 depicts a sample time study sheet.)

Because worker skill and effort vary, the timings of worker performance must be adjusted to represent the average working time of the average worker under average working conditions. Without leveling, observed performance time could represent anything from the best performance of the company's best worker to the worst performance of a newly hired employee.

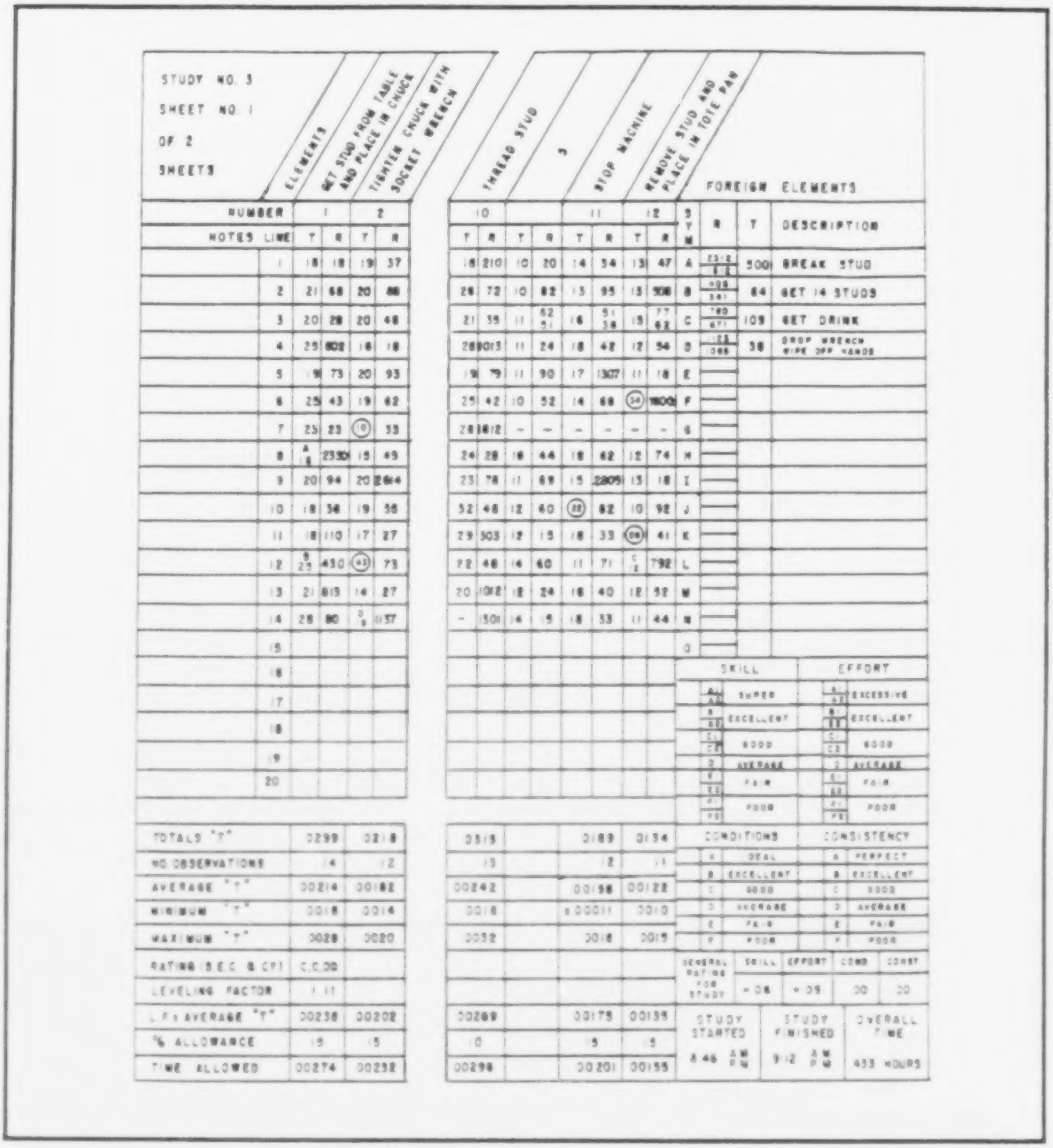
One is not likely to find a worker with average skill giving average effort under average conditions. Even for a worker with average skill who seems to give average effort, stopwatch recordings will vary due to minor differences in motions and efforts. You determine a leveled time for the operation by rating the effort and skill, the conditions of the shop, and the consistency attainable in the type of work.

Leveling accounts for conditions that affect the operator, not the operation. For example, a machine operator's hands and fingers may be stiffened because the plant is unusually cold on a Monday morning in the winter. This unusual condition will cause the operator to take more time, and the leveling factor can be used to account for this. However, if a broken conveyor belt forces an assembly worker to walk to pick up parts, the operation, not the operator, is affected by the broken belt and this condition could not be accounted for in the leveling factor.

Conditions should be rated according to what is average or normal for the place you are evaluating. While you may think the extreme heat in a forging department makes working conditions nearly intolerable, the conditions should be rated average or normal if they usually prevail in that department. Conditions, in fact, will usually be rated average.

Timings of manual operations will vary more than timings of automatic operations. The type of manual operation also influences the degree of variation in timings. Workers can develop steady rhythms for elements like picking up moderately sized machine parts, but an element like picking up circuit components will have irregular timings because they can be extremely elusive. Highly skilled operators usually are more consistent than unskilled operators, and great effort, particularly from less skilled operators, may tend to cause inconsistency.

FIGURE 5-2



STUDY NO. 3
SHEET NO. 1
OF 2
SHEETS

ELEMENTS	GET STUD FROM TABLE AND PLACE IN CHUCK		TIGHTEN CHUCK WITH SOCKET WRENCH		THREAD STUD		3		STOP MACHINE		REMOVE STUD AND PLACE IN TOTE PAN		FOREIGN ELEMENTS			
NUMBER	1		2		10				11		12		SYM	R	T	DESCRIPTION
NOTES LINE	T	R	T	R	T	R	T	R	T	R	T	R				
1	18	18	19	37	18	210	10	20	14	54	13	47	A	2312 [illegible]	500	BREAK STUD
2	21	68	20	88	26	72	10	82	13	95	13	508	B	408 341	64	GET 14 STUDS
3	20	28	20	48	21	35	11	62 51	16	51 38	15	77 62	C	780 671	109	GET DRINK
4	25	802	16	18	28	9013	11	24	18	42	12	54	D	128 088	38	DROP WRENCH WIPE OFF HANDS
5	19	73	20	93	19	79	11	90	17	1307	11	18	E			
6	25	43	19	62	25	42	10	52	14	68	㉞	1800	F			
7	25	23	⑩	33	28	1812	–	–	–	–	–	–	G			
8	A 18	2330	15	45	24	28	16	44	18	62	12	74	H			
9	20	94	20	2614	23	78	11	89	15	2809	13	18	I			
10	18	36	19	56	32	48	12	60	㉒	82	10	92	J			
11	18	110	17	27	29	303	12	15	18	33	(08)	41	K			
12	B 29	430	㊸	73	22	48	14	60	11	71	C 18	792	L			
13	21	815	14	27	20	1012	12	24	16	40	12	52	M			
14	28	80	D 8	1137	–	1501	14	15	18	33	11	44	N			
15													O			
16																
17																
18																
19																
20																

	1	2	10		11	12
TOTALS "T"	0299	0218	0315		0189	0134
NO. OBSERVATIONS	14	12	13		12	11
AVERAGE "T"	00214	00182	00242		00158	00122
MINIMUM "T"	0018	0014	0018		00011	0010
MAXIMUM "T"	0028	0020	0032		0018	0019
RATING (S.E.C. & CY)	C.C.DD					
LEVELING FACTOR	1.11					
L.F. x AVERAGE "T"	00238	00202	00269		00175	00135
% ALLOWANCE	15	15	10		15	15
TIME ALLOWED	00274	00232	00298		00201	00155

SKILL		EFFORT	
A1 A2	SUPER	A1 A2	EXCESSIVE
B1 B2	EXCELLENT	B1 B2	EXCELLENT
C1 C2	GOOD	C1 C2	GOOD
D	AVERAGE	D	AVERAGE
E1 E2	FAIR	E1 E2	FAIR
F1 F2	POOR	F1 F2	POOR

CONDITIONS		CONSISTENCY	
A	IDEAL	A	PERFECT
B	EXCELLENT	B	EXCELLENT
C	GOOD	C	GOOD
D	AVERAGE	D	AVERAGE
E	FAIR	E	FAIR
F	POOR	F	POOR

GENERAL RATING FOR STUDY	SKILL	EFFORT	COND	CONST
	+.06	+.05	00	00

STUDY STARTED	STUDY FINISHED	OVERALL TIME
8 46 AM PM	9 12 AM PM	433 HOURS

A large variance in time needed to perform an element usually means that something is wrong with either the operator or the operation. Small inconsistencies can be accounted for by leveling, but the reasons for large variances should be uncovered and corrected.

Predetermined leveled times, often called predetermined standards, measure the time taken to perform basic body motions, such as reaching for a part or releasing a part. Methods time measurement (MTM) is one system used to develop predetermined times. There are other systems and some contractors develop their own. There are many variations of basic systems, each tailored to a contractor's specific needs. You must know both the basic system and how it has been modified and used by the contractor.

With the MTM system, leveled times are measured in time measurement units (TMUs). A TMU equals 0.00001735 hour or one-sixteenth of a second, the time needed to shoot one 16mm motion picture frame.

Whatever the source of the predetermined leveled times, the contractor can use them to develop internal standard times. The total leveled time for the complete operation is the sum of the predetermined leveled times for the body motions required to perform an operation. Because each predetermined time is leveled, no further leveling should be required. Predetermined standards for innumerable body motions made under various conditions are available in industry publications.

Predetermined leveled times, used properly, are more accurate than standards developed by other techniques. However, predetermined leveled times require industrial engineering expertise and are expensive to develop. In addition, motions must be measured precisely; any error or misjudgment is multiplied many times before the contract's operations and processes are completed. For these reasons, predetermined leveled times are mainly used by contractors engaged in high-volume production.

Work sampling techniques, unlike those of predetermined standards and time study, are not based on continuous observations of several performances of one or a few selected workers. Also, individual worker motions or elements of a work cycle are not timed. Instead, the entire work cycle (an operation or process) is timed.

Accurate leveling of work sampling analyses is difficult, if not impossible. When work cycle times are long, the work sampling technique may be used in order to minimize time and expense. When work cycles are short and will be repeated many times during the contract effort, work sampling may be too imprecise for good estimates. The predetermined leveled time and time study techniques, if used properly, produce more precise results.

Leveled time would be standard time if operators could work without interruption, but uninterrupted work is impossible. To determine how long an operation or process should take, allowances are made for reasonable interruptions. The two basic allowances -- personal, fatigue, and delay (PF&D) and special allowances -- are part of the formula for computing standard time.

Average allowances may be calculated from accumulated data. Most contractors, however, have a percentage allowance calculated by sampling the interruptions that normally occur during the workday and that allowance is validated annually through work sampling.

PF&D allowance encompasses three allowances considered to be one component of standard time. A personal allowance of 5 percent, a fatigue allowance of 5 percent, and a delay allowance of 5 percent would be combined to become a PF&D allowance of 15 percent. A reasonable combined PF&D allowance, under normal conditions, would be no greater than 20 percent.

The personal allowance compensates for the time the average operator requires to take care of such personal needs as a drink of water and the restroom. A personal allowance does not normally include rest periods specified in collective bargaining agreements. These rest periods are considered time for recovery from fatigue. Some contractors, however, do include rest periods in the personal allowance. Lunch periods are not included in PF&D allowances.

The time that workers need to recover from fatigue is complex and controversial; even medical authorities disagree. Nevertheless, you may accept fatigue allowances when contractors show that personal allowances are insufficient for complete fatigue recovery. The time needed to recover from fatigue varies among individuals, but companies usually develop a company-wide fatigue allowance.

Delay allowance is for unavoidable, predictable nonproductive delays. Delays that can be included in the delay allowance are the times needed to replenish material at the immediate work station, to reject occasional substandard parts, to make minor repairs of tools and equipment, and to receive instructions. In some plants the morning start-up, which includes sweeping, is considered an unavoidable delay to be included in the PF&D allowance. The kind and amount of delays should be determined by periodic studies.

Avoidable delays should not be included in a delay allowance, because they should not happen. Avoidable delays result either from operator failure to exercise reasonable skill or judgment or from mismanagement, as evidenced by inadequate or improper instructions or supplies. However, delays such as those caused by power failures, major machine breakdowns, and interruptive acts of nature are unpredictable in both frequency and duration and should not be included in a delay allowance. Lost time resulting from such unpredictable delays is usually treated as an indirect cost.

Special allowances are used for delays not included in the PF&D allowance or realization factor. Typical delays included in this allowance are such unavoidable delays as time for cleaning and oiling machines and cleaning the work area if these duties are regular assignments of the direct factory laborers to which the particular standards apply.

Special allowances are based on work interruptions and are calculated in about the same manner as PF&D allowances. They are first determined as minutes and then converted to a percentage. The contractor usually applies a special allowance as a percentage of leveled time plus the PF&D allowance.

Standard times may be developed from standards and standard-related data from outside sources. Textbook data may be raw operational data that are usually tabular and represent recommended optimum operational time. Tables that deal with operations like drilling, milling, and grinding are typical of these types of data. These tables include information about feed speeds, tooling, and performance time. Some textbooks concentrate on a single industry's production processes. Although some tables include recommended job setup times, they do not usually include PF&D and special allowances. Other textbook data are "weighted average standards or norms," which include not only averages of raw operational data, but average standard times for performing average tasks. These data may be in either table or nomograph form.

Other sources of published standards and norms are industry magazines, pamphlets, and published texts of seminar presentations. The information in these publications usually is limited to the experiences of a single organization and contrasts with textbook information, which usually is derived from several organizations.

Individual equipment specifications, usually published by the manufacturer of the equipment, tend to be biased to promote equipment sales. Their acceptability depends on whether the material represents optimum or average performance and whether the quoted time is pure machine-controlled time or overall operation time, including worker functions.

Although most organizations publish their cost estimating data for in-house use as proprietary information, this information can and does become known throughout industry. Competitors are prone to use each other's data in their own estimating systems, thereby reducing the cost for developing and maintaining systems. Competitor's data should be used only when consideration is given to differences between companies' production methods.

In some organizations, some departments or divisions will lead in developing standards and cost estimating techniques, and sometimes one group will use data from another. These data should be used with extreme caution; standards and norms developed in one environment are not always reasonable in another environment, depending on such variables as equipment, workflow, and working conditions.

Some contractors develop intracompany or company-wide labor standards, which can be applied anywhere in the plant. They include leveled times, allowances, and standard times, all of which should be used with the caution due interdivisional or interdepartmental data.

MIL-STD-1567A, Work Measurement

This military standard is intended to help achieve discipline in contractors' work measurement programs so as to improve productivity and efficiency in their industrial operations. The standard requires use of a work measurement program on selected contracts. For contract pricing, the key elements in the standard are plans to (1) establish and maintain engineered standards, (2) conduct methods engineering studies and upgrade Type II labor standards to Type I, (3) use labor standards in budgeting and estimating, and (4) correct system data when labor standards are revised.

Type I engineered labor standards must reflect an accuracy of plus or minus 10 percent with at least a 90 percent confidence at the operation level. Type I standards must include records documenting (1) operations analysis, (2) the practice or method used to develop the standard, (3) rating or leveling, (4) the standard time computation including allowances, and (5) observed or predetermined time values used to determine the final standard time.

Labor standards will be used to estimate touch labor hours for contract changes and in estimating the prices of initial and replenishment spares and follow-on production buys.

Projecting Standard Times

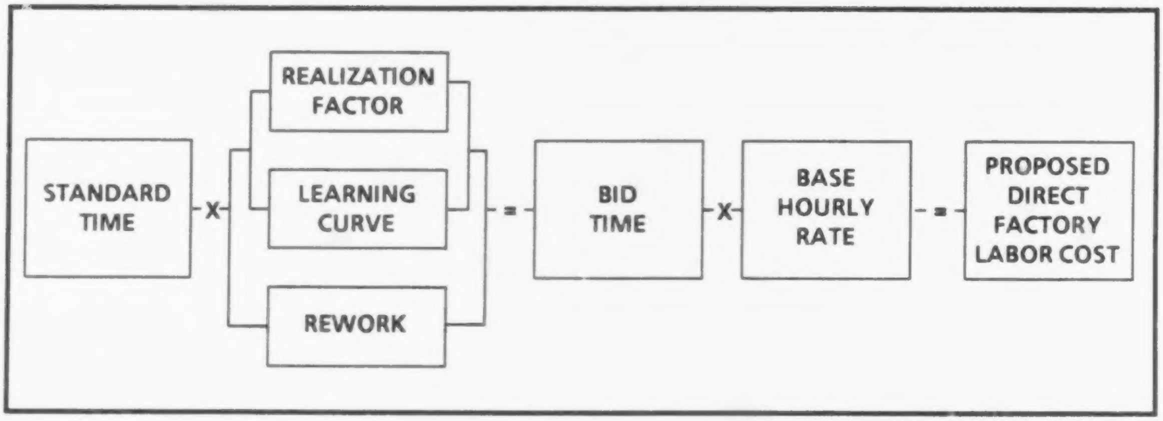
Standard performance seldom can be maintained throughout production because (1) unpredictable delays do occur, (2) all workers do not possess average skills, and (3) workers seldom begin at or maintain standard performance. Moreover, although predictable delays usually are included in standard times, a contractor can account for these interruptions by other acceptable means.

Direct factory labor cost is estimated by multiplying the estimated hours by the base hourly wage rate. We would like to pay for operations and processes completed in their standard times, their "should-take" times, but standard performance may not be achievable. We accept estimates that exceed standard as long as the gaps between standard and proposed performance are reasonable and the contractor can support them. Actual times are used with standard times to project bid times. Once the standard time is determined for an operation or process, the proposed time for that operation or process can be determined by formulas that project the difference the contractor has historically maintained between standard and actual performance.

These formulas are realization factors, learning curves, and rework factors. Figure 5-3 below shows the application of these factors.

Realization factors are ratios of actual time to standard time. For example, if a standard time is one hour, and one-and-one-half hours were actually spent, the realization factor would be 1.50. You derive 1.50 by dividing the actual time (one-and-one-half hours) by the standard time (one hour). A realization factor of 1.50 means that the actual time required for a process is 50 percent more than the standard time.

FIGURE 5-3



A contractor determines realization factors by comparing actual performance with standard time. That is, the contractor records the time actually spent to perform specific activities. Then it divides the recorded actual time for each activity by the predicted standard time for that activity. By averaging historical realization factors, the contractor can determine an average realization factor to use in estimating performance.

Some contractors use efficiency factors rather than realization factors. An efficiency factor, the mathematical reciprocal of a realization factor, is derived by dividing standard time by actual time. Suppose eight units should be produced in an eight-hour day (one standard hour per unit), but only six units are produced. If you divide the six-hour standard time by the eight-hour actual time, you will get an efficiency factor of 0.75 or 75 percent. A 75 percent efficiency factor is equal to a 133 percent realization factor. An efficiency factor of 75 percent means that the contractor's workers are producing 75 percent of what they are supposed to produce in standard time.

Learning curves are another way of projecting standard performance, in light of which actual performance can be evaluated. The basic theory of this curve is that performance improves in predictable fashion with each repetition of an operation or process. As operations are repeated, efficiency increases and direct labor time input per unit declines.

The use of a learning curve is influenced by whether the buy is a first buy and whether the buy will include breaks in production. Although a contract may be a first buy, the end product may be similar to other items made by the contractor. If so, experience on similar items may provide data for estimating the slope of the curve.

The production break is the time interval between the completion of certain units of equipment and the beginning of a follow-on order or contract for identical units of equipment. This interval disrupts the flow of production and may cause a regression to an earlier point on the curve.

There is no consistent, reliable way to predict the amount of learning that may be lost with a production break. Information on the effect of previous breaks in production of similar items should be used to predict the effect of a current break. Even if no information is available, don't accept the argument that all learning has been lost; worker learning is not the only factor determining shop performance.

The loss of experience varies with the duration of the production break. If any impact from a production break exists, the greatest impact would be on direct labor learning and the least impact would be on methods improvements instituted during the initial production run. A return to unit one as the starting point for a follow-on order is unreasonable.

Rework occurs when a part or assembly is rejected in an inspection or test and sent back for correction of the deficiency. In addition, some completed parts and assemblies must be reworked to incorporate minor design changes. Although rework costs may be included in the direct factory labor estimate, rework caused by design changes covered by engineering change proposals is excluded.

When a contractor bases projected time on data derived from a standard cost system, a rework factor usually is applied as a percentage of leveled time. But generally, when a historical cost system is the data base, the rework costs included in the actual times eliminate the need for applying special rework factors. A contractor using a historical data base and maintaining separate rework data and applying rework factors risks making double-charges.

Analyzing labor estimates

You should review the number of hours estimated for a job. If indirect expenses are allocated on the basis of factory labor hours, this review is especially important; any error in estimating the base labor costs will be compounded when allocating indirect expenses. Direct factory labor costs plus overhead are usually a large part of the total estimate and frequently represent a substantial segment of costs that can be controlled.

Part of understanding and evaluating estimated labor is to recognize the patterns in the incidence of different types of labor. At the start of the program or the contract, there may be a relatively heavy input of design and production engineering effort. As this effort peaks and then decreases, tooling and setup effort increases and, after it peaks, machining and assembly labor become predominant. At the end of the contract effort, practically all the work is being done by assembly and final test labor.

In evaluating direct factory labor hours, the objective must be to determine that proper planning preceded the estimate and that it assumes reasonable efficiency.

In the direct manufacturing labor cost example shown earlier in this section, the contractor proposed Task 1 using an 83 percent curve based on actual costs incurred under a prior contract. The first step in analyzing this cost is to determine the similarity between the two production runs, to find out if the same manufacturing methods and tools will be used.

The next step is to evaluate the engineering estimates for unit T^1. What are they based on and how were they developed? The next step is to determine the equity of starting the new contract at T^1. If this production run is similar, or has similar parts or components, the prior experience should be considered and a lower starting point should be used.

During review, compare the mix of labor for this contract with the actual mix under the previous contract. If the mix is different, you should try to establish your assessment of the labor hours for Task 1.

For Tasks 2 and 3, the contractor indicated that actual hours for 19X5 and 19X6 are not appropriate for comparison or estimating. Make sure you agree. Is a complete start-up necessary for this production run? How do the quantities compare, that is, the number of units produced per day, week, or month? It is highly unlikely that the estimate should be calculated from unit T^1 even if there has been a production break. Has the contractor been producing similar models? If so, perhaps this production should be computed further down the curve.

Labor Estimates Based Primarily on Historical Costs

Some contracts call for a partially new product, one the contractor has not made before but which contains components and parts it has made. For items it has made or is making, actual times, or projections thereof, may be acceptable if procedures have not changed and are not expected to change. For items it has not made, the estimate should be based on the cost of producing similar items, plus any reasonable factor necessary to account for differences in product requirements. The contractor should substantiate any such factor.

Remember that personal needs, fatigue, unavoidable delays, and rework already are accounted for in the actuals. Unless the contractor can substantiate that such time requirements must be accounted for separately, do not accept an addition of such allowances or factors to actuals.

There are certain basic questions to ask when you evaluate labor estimates made using historical costs:

a. Is the production line to be operated the same as in the past? Has the contractor acquired new machinery such as tape-controlled items? If so, adjust for the changes.

b. Do historical costs include the cost of changes? If yes, either eliminate them or remember that you are projecting past costs into the future; look searchingly at any allowances the contractor might propose.

c. Has the make-or-buy plan changed? If the contractor is now buying items previously made and has included their prices in the bill of materials, delete the make-hours from the base.

d. Are some labor functions included in the historical costs now estimated separately on a manloading basis? If yes, delete from the historical data and check to see how the separately estimated hours compare with that history.

Labor Estimates Based Primarily on Labor Standards

Look at how the contractor determined leveled times. Examine the number of time studies or work samples to find out if it made enough studies or examined enough samples to develop realistic leveled times. You may need help from Government industrial engineers.

To evaluate leveled times based on predetermined standards, compare the predetermined standards used with those in industry publications. Also, find out if the contractor has attempted to level any operation times based on predetermined standards. Predetermined standards themselves are leveled, so no leveling factor should be applied.

A contractor may allow for such effort as work station clean-up and minor machine maintenance in either a PF&D allowance, a special allowance, or a realization factor. Make sure the contractor does not duplicate the time allowed for any such effort. Unpredictable or avoidable delays should not be covered in the allowances or the realization factor.

If a contractor uses a special allowance to compensate for unusual working conditions, examine the backup data. Make sure that no extra time is included in the leveled time or in a different allowance to account for the special working conditions.

Some contractors, claiming operating conditions are different, apply special allowances to leveled times developed by industry associations. The conditions might be different, but you should ask what the differences are and why they exist. Because predetermined standards are developed under typical shop conditions, you shouldn't allow adjustments unless the contractor can explain why it operates under less favorable conditions.

A contractor may have relied on an engineering estimate rather than time studies to determine an allowance. If so, ask him to explain the estimating procedure. If you think an allowance is justified but the contractor can't convince you that the method has produced an acceptable allowance, develop your own estimate.

Ordinarily, a learning curve represents actual performance. When the curve is used, no realization factor should be applied. A realization factor greater than 1.00 means that work is below standard. If the contractor is proposing times that are greater than standard, find out why. A contractor may apply a realization factor to account for below-standard work attributable to the inexperience of newly hired employees. This is acceptable, but check the labor rates. The estimated rates should be the average of the rates to be paid during the life of the contract. Lower wages should be paid to inexperienced workers and this should reduce the average.

In analyzing learning curves, check the contractor's mathematics. If the math is right, move on to the data. The unit 1 cost and the slope should be based, if possible, on past production of identical or similar end-items. If there are no data, unit 1 cost may be developed from standard times and the slopes may be based on published industrial data. The contractor should identify the sources for the curves and you should use other sources to check.

A contractor who uses a steep slope is saying it will gain experience more rapidly than if it had used a shallow learning curve slope. Look at the unit 1 value, however. An 80 percent curve is more impressive than a 90 percent one, but the effect of a steep curve can be offset by a high unit 1 value. For example, if an 80 percent curve is applied to a unit 1 time of 100 hours, the 50th unit will take 28.38 hours. If a 90 percent curve is applied to a unit 1 time of 52 hours, the 50th unit also will take 28.38 hours.

Unless a contractor can prove that it is totally inexperienced in making a particular product, do not accept estimates starting from unit 1 costs. Production breaks may cause some loss of learning, but once a company has significant experience producing a particular product, it is unlikely to lose all learning. Learning curves may be unit curves or they may be cumulative average. Either one may be acceptable, but don't mix them; don't read off a unit curve and project a cumulative average.

Rework factors should be supported by historical data. The contractor should not select a rework percentage from a few contracts or short time periods. One year's accumulation of data should provide a reliable index. Also, if you are paying for high cost, high reliability material in direct material costs, the contractor should return any defective material to the vendor; you shouldn't pay for rework.

If you are at the contractor's plant, you can go beyond the traditional accounting and financial analyses. For example, your evaluation of leveled time might branch out. Leveled time has been defined as the working time of an average worker working under normal conditions. But does the contractor use this definition? Its leveled times could represent anything from the best worker's performance under ideal conditions to the worst performance of a marginal worker recuperating from a car accident. The contractor can use whatever definition it chooses. Your job is not to argue vocabulary, but to make sure the estimated times are reasonable.

To evaluate leveled times by sampling, measure several performances or get an industrial engineer to do it for you. Pick several performances of the same or similar operations. The following shows how you might evaluate the leveled time for a selected operation.

Assume the proposed leveled time for an operation is 0.33 hour or 20 minutes. Your observations last two hours. Eleven operations were completed in the two hours. A 10-minute rest period was the only apparent interruption during your study. You consider the overall pace of the observed work to be normal.

This figures out to be 110 minutes productive time (120 minutes study time minus the 10-minute rest period.) Dividing 110 minutes by 11 completed operations equals 10 minutes (0.17 hour) per operation.

The proposed leveled time (0.33 hour) minus the observed performance time (0.17 hour) leaves a difference of 0.16 hour (9.6 minutes) required for each operation. This difference is significant and requires further analysis.

Suppose the contractor says the PF&D was underestimated? The 10-minute rest period was the only interruption you observed, so your next question is why the contractor needs a greater PF&D allowance. Even if it can support some increase in the allowance, the proposed leveled time is 194 percent of the average time observed. To claim an additional 94 percent of the leveled time as a PF&D allowance would mean that nearly half of the proposed leveled time would have been nonproductive. This is not acceptable.

You didn't spend a whole day observing worker performance. You should expect some PF&D allowance besides the 10-minute rest period, but even if 25 percent of the observed time (0.17 hour) were added as PF&D allowance, the standard time would be only 0.21 hour, a figure significantly less than the proposed leveled time of 0.33 hour.

Suppose the contractor made a mistake. The 0.33 hour is the standard, not leveled, time. The contractor says the leveled time is 0.17 hour and PF&D allowance is 25 percent of leveled time, giving a total of 0.21 hour. The contractor says it must apply a special allowance of 57 percent of the 0.21 hour, which gives the 0.33 hour standard time.

In other words, out of an 0.33 hour standard, the contractor would be allowing 0.12 hour for special production delays. In addition to the PF&D allowance, the contractor would be allowing 36 percent of standard performance time for nonproductive time. The contractor must justify this.

Another way to evaluate leveled time is to compare the machine feed rates specified in the contractor's process sheets with the actual feed rates you see in the machine shop. Remember that fabrication cost estimates of machining operations are based on the feed rates specified in industrial engineering standards. If workers discover that they can increase the feeds and speeds on their machines beyond the values listed on the process sheets, inflated or loose standards can result.

This example has treated one aspect of the estimated labor time: leveled time and allowances. Similar lines of observation and inquiry should be followed in testing realization and efficiency factors, learning curves, and rework factors.

Summary questions

The following are questions to ask yourself when you think you have finished analysis of direct factory labor costs:

a. Is the factory labor estimate prepared in accordance with the contractor's established estimating methods? Have the estimating methods been reviewed by Government personnel? Are the methods consistent with the contractor's cost accumulation practices? Are the methods relating to factory labor acceptable?

b. If the estimate covers items or parts previously made, is it supported by historical data? What do the data show?

c. If the estimate covers items or parts not previously made, is it supported by historical data for similar items adjusted for differences in product requirements? What do the data show?

d. If the estimate includes a separate factor for such things as fatigue, changes, unavoidable delays, and rework, are the time requirements accounted for separately? Are they also included in the basic factory labor estimate? Are they included somewhere else? Do you consider the amounts to be reasonable?

e. Have manufacturing methods or plant conditions changed since the time covered by the data being used? If yes, are the changes so radical that the data cannot be used, even if adjusted?

f. Has the contractor's make-or-buy plan changed? If it is now buying subcomponents, has the factory labor related to them been eliminated from the historical data?

g. If the estimate is based primarily on labor standards, are the standards the most recent? Are they up-to-date? If the standards are based on time studies, are you satisfied that the contractor made enough studies to develop accurate leveled times?

h. If labor standards are used, are the PF&D allowances calculated from data accumulated over a representative time period?

i. In evaluating a realization factor or an efficiency factor, are you satisfied the factor is representative of workers' performances?

j. If you find a high realization factor, indicative of a wide gap between standard and actual time, does it mean there are shop inefficiencies? Are you satisfied with the condition?

k. Do you understand what the contractor has done in projecting hours using a learning curve?

l. Has the contractor used a unit or a cumulative average curve? Is the method used compatible with the historical data?

m. How did the contractor establish the slope of the curve? Is it realistic?

n. Has the historical data been purged of such nonrecurring costs as engineering changes, program redirections, rework, production start-up, production stretch-outs? Are you satisfied with the way this was done?

o. Are you satisfied with the way the contractor handled breaks in production? If there have been changes in the manufacturing methods, have they been considered in the curve application?

p. If the contractor uses a standard cost accounting system, are the standards the same as the ones used in the proposal? If not, are they compatible?

q. Does the contractor compute variances at a level low enough to assure that product costs are not distorted for any customer?

r. Are variances determined at least monthly?

5.3 Engineering Labor

You can use many of the techniques used in other cost areas to estimate and evaluate the costs of engineering and scientific efforts. Estimating and pricing difficulties can be traced to three factors: the nature of engineering efforts, the lack of agreement on terminology, and the absence of standard accounting treatment.

Inclusion of a demonstration and validation phase in the development of major systems and subsystems has helped in estimating the costs of both engineering and production effort. The underlying objectives of system validation, as a preliminary to engineering development, are to: establish firm and realistic performance specifications; define interfaces and responsibilities; identify high-risk areas; verify technical approaches; establish firm and realistic schedules and cost estimates for engineering development; and establish planning schedules and cost estimates for the total project.

Steps like system validation are intended to reduce the degree of performance uncertainty, either by eliminating the causative factors or by isolating them to permit detailed review and evaluation. These should result in a more reliable body of data on which to base the various engineering evaluation approaches discussed in this chapter, particularly in the procurement of new systems and subsystems.

Contractors normally estimate costs by the type of work the engineers will do on the contract, regardless of their academic backgrounds. Further, while this work can be broken down into design, manufacturing, quality assurance, reliability, maintainability, and sustaining engineering, there is overlap.

There are varying amounts of nonrecurring and recurring efforts in each category, depending on the complexity and newness of the product being produced. Obviously, if a product is both complex and new, the amount of nonrecurring cost will be greater than if the product is relatively simple or if the contractor has developed similar items.

It follows that the nonrecurring effort also will vary by the type of effort involved and normally will decrease as the effort moves from design to reliability, maintainability, manufacturing, quality assurance, and then to sustaining engineering, the primary recurring effort.

Design engineering involves delineating the product's physical characteristics, dimensions, and material specifications. Design engineers work with documentation personnel to produce design specifications, drawings, parts lists, schematics, technical manuals, spares lists, and other documents describing exactly what is to be built. The initial development of a product's design is a nonrecurring effort. Recurring design engineering efforts are expended on modifications to the existing design.

Manufacturing engineering, also called production planning, involves planning the direct manufacturing labor activities for producing the end-item, writing process instructions and methods sheets, organizing work stations, assigning tools and machines, and developing and administering schedules to match shop capacity with contract commitments.

The planning efforts of manufacturing engineers such as writing procedures, assigning machines, and setting up schedules, are generally nonrecurring. Their administrative efforts, such as reviewing schedules and manufacturing methods, are recurring.

The contractor may classify all or some manufacturing engineering as tooling effort. If the proposal includes manufacturing engineering in engineering labor, make sure that it's not in the tooling estimate as well.

Reliability and maintainability engineers are responsible for ensuring that products are designed and manufactured to meet longevity requirements specified in the contract. They also document and test to demonstrate compliance with reliability specifications. They prepare training and repair requirements, monitor repairs, and perform other tasks to ensure favorable ratios of use to downtime.

Nonrecurring reliability and maintainability engineering efforts include the development of preventive maintenance schedules and written procedures for field tests and equipment maintenance. Recurring efforts include performing mean time between failures (MTBF) and mean time to repair (MTTR) tests and advising the design engineers of the results.

Quality assurance engineering is the creative effort needed to formulate standards and specifications that describe tests and inspections to make sure the product meets the Government's requirements, and that describe the actual design of special fixtures and equipment to be used in conducting the tests. Some degree of quality assurance normally is required at each stage of hardware development and production.

Developing test procedures and designing special test equipment are nonrecurring quality assurance engineering efforts. Analyzing test results, special testing, and reviewing engineering change proposals are recurring efforts.

In essence, sustaining engineering is a synonym for recurring engineering. Contractors must assign engineers to watch over production and testing for the life of the contract. These same engineers may have some of their time charged to other categories, but the contractor obviously should not charge time for the same effort to both sustaining engineering and some other engineering category.

Engineering labor cost information

You may need historical data to evaluate the reasonableness of the proposed labor hours for each type or kind of labor proposed. However, this does not mean that the data submitted must be limited to data on like or similar tasks.

For instance, when an engineering design effort is estimated on a judgmental basis, you may need a considerable amount of data on the design engineering group itself. In order to evaluate the proposed effort, you may require such data as total manpower figures, number of drawings produced, size of drawings, and volume of design changes. A more specific example is shown in Tables 5-33 through 5-36.

Example 16 – Engineering Labor

Table 5-17 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 5-17

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Direct engineering labor	$330,615	$3,306.15	Attachment 4

The offeror's submission, as shown in the reference column in Table 5-17, includes an attachment supporting the $330,615 direct engineering labor estimate. This is reproduced here as Attachment 4.

Attachment 4 - Direct engineering labor

Design, testing, and drafting hours (Table 5-17A):

TABLE 5-17A

Task 1	5,000 drawings @ 3 hrs per drawing	15,000
Task 2	2,000 drawings @ 3 hrs per drawing	6,000
Task 3	900 drawings @ 3 hrs per drawing	2,700
	TOTAL	23,700

Hours per class of engineer (Table 5-17B):

TABLE 5-17B

ENGINEER	TASK 1	TASK 2	TASK 3	TOTAL
Design	4,500	1,800	810	7,110
Drafting	7,500	3,000	1,350	11,850
Aeronautics	3,000	1,200	540	4,740
TOTAL	15,000	6,000	2,700	23,700

Computation of engineering labor costs (Table 5-17C):

TABLE 5-17C

ENGINEER	TOTAL HOURS	LABOR RATE	TOTAL COST
Design	7,110	$16.50	$117,315
Drafting	11,850	11.50	136,275
Aeronautics	4,740	16.25	77,025
TOTAL	23,700	$13.95	$330,615

The number of direct engineering hours is based on the requirement for an estimated number of drawings for each task. Task 1 requirement is based on contract -0375, which required 6,000 drawings for a similar design. Based on the previous experience and a slightly less complex item, it is estimated that 16 percent fewer hours will be required. The data to verify the number of drawings for contract -0375 are in the files of the Engineering Department, Building 8A. Tasks 2 and 3 requirements are based on the actual drawings required for our commercial item Model A4J. It is estimated that the same number of drawings required on Model A4J also will be required on Tasks 2 and 3. Model A4J drawings dated between February and May 19X2 are located in the Engineering Department, Building 8A. The time required per drawing is the same as the average time experienced in 19X4. This can be identified by the cost summary figures in the cost ledger.

The proposed labor rates were based on the actual average labor rates for the functional labor classifications (Departments 428-4, 6, 9), as shown in the monthly labor distribution tab run dated 31 October 19X4. The actual rates were increased by 2 percent to cover half of the average yearly growth (years 19X2, X3, and X4) in the engineering department labor rate for the estimated period of performance under the proposed contract.

Factors influencing the estimate

To evaluate engineering costs effectively, you must know the contractor's concepts, practices, definitions, and accounting treatment. You need some skepticism too, because scientific and engineering achievement is more a function of the quality of effort than of the quantities of people employed.

Engineering effort can be highly creative, involving the thinking of highly educated individuals. It can also be less creative or largely repetitive. Creative engineering is involved in the design of a new system or component when the performance characteristics or the state of knowledge of a material's properties or a manufacturing process are to be moved forward.

The less creative types of engineering effort include preparing, copying, and correcting drawings; planning and developing tooling; planning and setting up production lines; and planning and devising plant layouts. Engineering effort as considered here embraces the range from design and preproduction engineering through production and support engineering.

A contractor's engineering estimate will be shaped by complexity, availability of engineers, degree of competition, judgment, and accounting and estimating methods. Those factors are discussed in the following paragraphs.

Complexity

The complexity of the system or item, and consequently the degree of design and engineering skills and technology required, heavily influences the content and makeup of engineering estimates.

If the contractor is operating at the outer limits of the state of the art, the engineers face the problem of designing equipment that will operate outside known envelopes of performance. New techniques and methods may be required to manufacture the items, and new materials also may be required. Such requirements may lead to drastically higher estimates of engineering manhours.

The complexity of an item usually is a subjective consideration. You might be able to develop a feel for the complexity by relating the item to a similar item in terms of density or by developing a ratio such as the estimated engineering cost per pound of product. Yet, while the complexity of the item is quite important, a company's talk about advancing the state of the art, pushing beyond today's frontiers into the unknown, and developing new and exotic materials and relatively unknown manufacturing techniques can be misleading.

For years, the Government and its defense and aerospace contractors have pushed forward in the research and development of new systems, and, while items are becoming more complex, today's base of knowledge is far broader than it was a few years ago. Because complexity is relative, the problems requiring engineering effort may not be greater now, relatively speaking, than they have been in the past, and they may be simpler. Although it is difficult to get a solid grip on this factor, the technologies available, as well as the complexity of the work, must be considered before arriving at an overall estimate.

Available Engineering Manpower and Degree of Competition

These are two interrelated factors that often influence a contractor's engineering estimate significantly. In many cases, the Government is the sole or largest customer of a company that produces an extremely complex product in a highly concentrated industry. The type of industry and the degree of competition that actually exists are important considerations, and the several tools of analysis are substitutes for competitive forces whose presence often insures greater contractor realism in cost estimating and more effective control over the size of the engineering organization.

Competition in the design and development stages can have an opposite result, however. It can lead to unwarranted optimism, and competing firms may minimize their estimates of numbers and talents needed to meet the technical challenges. The objective of your analysis is to determine the realism of the estimate.

Judgment

Projecting the estimated hours of direct engineering effort may be difficult. The judgment decisions of company engineers familiar with the equipment or with similar systems or items may control the estimate. In turn, you should make your judgment concerning the realism of and need for the number and kinds of hours estimated after you get all the assistance you can from Government technical personnel, including the auditor.

The enthusiasm engineers may have for perfection and for trying new ideas may need to be tempered to procure an effort that will fulfill the requirements at a reasonable price. It is not enough to ask the opinion of engineers. Their answers must be evaluated. The benefits from this skepticism may be twofold: little by little you will learn about engineering and its language and you will be confident, in a particular case, that you and the engineer understand each other's problems.

Accounting and Estimating Methods

The method of costing should be the basis for estimating. If the contractor has contracts for several research projects, or if it has separate contractual coverage for such things as product improvement effort, design studies, reliability studies, or technical services, the accounting methods must permit segregation of these various engineering tasks.

Many accounting systems make no provision for segregating design and production engineering, but instead accumulate and record these costs as part of manufacturing overhead. If the procurement requires either more or less special design and production engineering effort than is required by a contractor's normal work, this estimating approach may not be equitable. The cost accounting system needs to be refined.

The contractor's projections must be realistic in relation to experience. However, if the engineering effort associated with design, preproduction, and start-up has been prorated over an initial production quantity, care must be taken in subsequent pricing to ensure that the same effort is not projected again for follow-on procurement. If all or part of this effort was included in overhead, be careful in projecting future overhead rates.

If you are revising the price of a contract before completion or are definitizing a letter contract, you must identify and segregate this type of effort if the balance of the work is to be estimated properly. Similarly, you should purge unusually heavy engineering charges from the data from which projections are made. Including these costs could result in unreasonably high projections. In addition, you should purge, to the extent possible, amounts representing uncontrolled or otherwise unreasonable expenditures.

An estimating method that considers average design and production engineering is acceptable if the contractor can demonstrate that this approach is equitable. However, a contractor who charges this type of engineering to manufacturing overhead should not include engineering as a separate item in the estimate. In some instances, design engineering is estimated separately and production engineering is included in overhead. If this is the contractor's standard practice and a review of history and forecasts indicates equity, production engineering can be accepted as a part of overhead.

Analyzing the estimate

There are several approaches to analyzing an estimate, any one of which may be useful in a particular situation. These approaches are task, ratio of support, availability, learning curve, production engineering ratio, and level of effort. They may be used singly or in combination.

Task

The task approach is used in contracts for research and certain categories of development. The total task is broken down into smaller parts to establish clearer understanding. The effort required is related to time and to skills, or perhaps to individuals in the contractor's organization, so that probable costs may be estimated more realistically. Despite the intangible nature of many projects, with this approach and with hours and dollars identified with portions of a project, you should be able to determine the realism of the contractor's approach and resulting estimate.

Ratio of Support

This method is used on contracts for research or development. It involves estimating the number of man-months of creative engineering required for the project and applying ratios, based on experience, to develop estimates of support engineering. This limits the area of judgment to estimating the time of creative engineers and depends on applying a factor to develop the remainder of the estimate.

In developing or using ratios, it is better to have a number of experiences that have been reduced to average ratios than factors developed from one or two projects that might not represent average expectations. No two companies are likely to have the same classification of engineering effort or to use indentical methods of accounting for engineering labor. Accordingly, this method is best adapted to comparisons within one company and is unlikely to be useful in intercompany comparisons. One danger of this approach is that it tends to perpetuate cost levels without regard for whether the contributing expenditures were reasonable and necessary.

Availability

This approach requires you to know the resources committed to other programs as well as to the project under review. Hours by engineering classification can be analyzed by relating total engineering hours, converted to man-months, to manning charts that show the pool of skills available to the contractor for the period of contract performance.

The basic idea is that a contractor cannot sell engineering hours in excess of the engineering capability. You must see that available manpower reserved for planned future programs or for changes is not included in the basic estimate for the project you are analyzing. When an estimate reflects a projected buildup of manpower, the buildup must be tested for need, the skills available in the labor market, and the reasonableness of the contractor's expectation that it can add staff at the projected rate.

The size of the contractor's engineering labor force at the time the estimate is being prepared is an important factor in the amount of engineering the contractor may include in the proposal. If the engineering force is large in relation to present workload, the contractor may be under less pressure to minimize the engineering cost estimate. The contractor's plans for future use or possible expansion of the engineering force may encourage high engineering cost estimates in the proposal. This obviously would make it more difficult to negotiate a reasonable and necessary level of engineering effort.

Learning Curve

Using learning curves to evaluate engineering estimates creates controversy, but discriminating use is feasible. It is most useful in hardware buys when it is possible to differentiate among recurring and nonrecurring engineering efforts. In this application, nonrecurring may be defined as the hours incurred before first delivery, and recurring as the hours spent afterward.

Many people resist applying a learning curve to engineering. This may result from a misunderstanding of the application. In using this approach to estimate and analyze engineering effort, you must accept the premise that at least a part of the design is complete with delivery of the first article. While the first article of any complex item may not be exactly what is wanted, you must expect the rate of design effort to decrease with subsequent production.

You also must accept as fact that the increase in engineering brought about by doubled production quantities will usually be less than directly proportionate. Engineering design effort is related to the product regardless of quantity, and production liaison and support engineering may be more closely related to time than to quantity.

This method does not contemplate either the mechanical application of a fixed curve or the use of a fixed mathematical formula to establish a standard value. The log-log curve used to estimate engineering hours may be a cumulative curve that portrays total hours expended and to be expended in relation to total project hours to date. To estimate, you use the slope experienced on prior projects, modified to take into account differences between the historical project and the one being estimated.

Differences may be found in the degree of complexity of the product, the project in relation to the state of the art, or the need to develop new manufacturing techniques. In reviewing modifying factors presented by contractors, remember that for years you have bought products that represented radical innovations. As a consequence, the complex problems of today may require no more engineering effort than today's commonplace situation required when it was yesterday's unknown.

The starting point in portraying the early stages of a new product must come from comparisons with prior projects. It is obvious that the graph of engineering hours leaves something to be desired when both the starting point and the slope are based on modifications of prior projects, but it may develop a useful estimate.

This method ordinarily should be used only for major projects at the time the first article is practically complete and basic design has been largely established. At such a point, using total engineering hours to date as a basis and a project history of engineering hours plotted against the calendar, you can construct a realistic curve for projections. Use all available history and take note of two influences: the need for a careful interpretation of the effect of changes past and future and, as design becomes more stabilized, less liaison between engineering and manufacturing.

Production Engineering Ratio

This estimating tool produces a rule of thumb with no claim to exactitude. The approach is grounded in the observation that engineering effort per unit of product diminishes faster than production effort. It also assumes a direct relationship with production effort.

For example, assume a situation where you have adjusted estimated production labor hours. Analysis establishes that the original estimate of production engineering effort is reasonable. However, an adjustment of direct production hours should lead to an adjustment in the production engineering dollars to restore the relationship that existed before the change. The reason is that the bulk of follow-on engineering hours constitutes liaison with manufacturing and therefore manufacturing is a determinant of the level of engineering effort. You also should test for ratio application. In some industries, companies have established sound ratios between production and engineering hours that hold fairly constant for different projects.

Level of Effort

Analysis of level of effort may be used on programs that are reasonably stable in design and in production schedule. This approach assumes that the required effort is closely related to time and is influenced by stabilization in design. A given number of engineers must be used to provide liaison and support for the production of an article. Consequently, a given quantity of end-items produced over a long span of time will require a greater number of engineering hours than the same quantity produced over a shorter span.

In the early stages of a design, and before either the design or production schedule has been stabilized, liaison and production engineering effort must be keyed to changing configuration, changing tooling concepts, and disruptions in the production line, as well as acceleration of the production schedule. This obviously requires more production engineers than would be required after stability has been established.

Graphic review

Bell-shaped graphs can be used to compare the current estimate with actual hours on prior projects. These curves usually show the total production engineering hours each month, with the date of the contract, date of first delivery, and date of last delivery superimposed on the same graph to relate engineering effort to the entire contract and particularly to the delivery period. Where shown separately, field service effort will lag behind other types of engineering because it is generated after the articles are subjected to field use.

Figure 5-4, an example of this approach, represents a follow-on procurement. It portrays incurred hours by month, as well as total accumulated hours at the end of each month. In this case, the original design work was completed on a prior contract.

A curve such as this covers design engineering related to changes and revisions, as well as assigned production engineers. In working with this type of graph, the costs for changes ordinarily cannot be segregated from total cost and, as a consequence, historical records must be adjusted to arrive at hours that exclude contract changes. Patterns of incurred hours tend to follow similar shapes and slopes within an industry or on similar projects within an organization.

The principal uses of such graphs are to:

a. Verify the total number of workers to be used;

b. Establish an estimate of total hours required when a portion has been incurred; and

c. Determine the midpoint of effort in estimating labor and overhead rates.

The division of the average hours for a given month by the average hours to be worked per month establishes or verifies average personnel requirements.

Calculations of ratios on prior projects will yield percentages of incurred hours in relation to deliveries. In Figure 5-4, 45 percent of the total hours were incurred when first deliveries were made and 80 percent of total hours were incurred when half of the deliveries had been completed. Assuming this to be a proved pattern based on several projects, if you want to estimate probable total hours for a project and 10,000 hours have been incurred up to and including the month of first shipment, the estimate of the total hours for the project would equal 10,000 divided by .45 or 22,222 hours.

In applying estimated labor rates to total estimated hours, quarterly or semiannual rates may be desirable because of fluctuations. Graphs similar to Figure 5-4 will help you estimate the total hours for each quarter for rate application purposes.

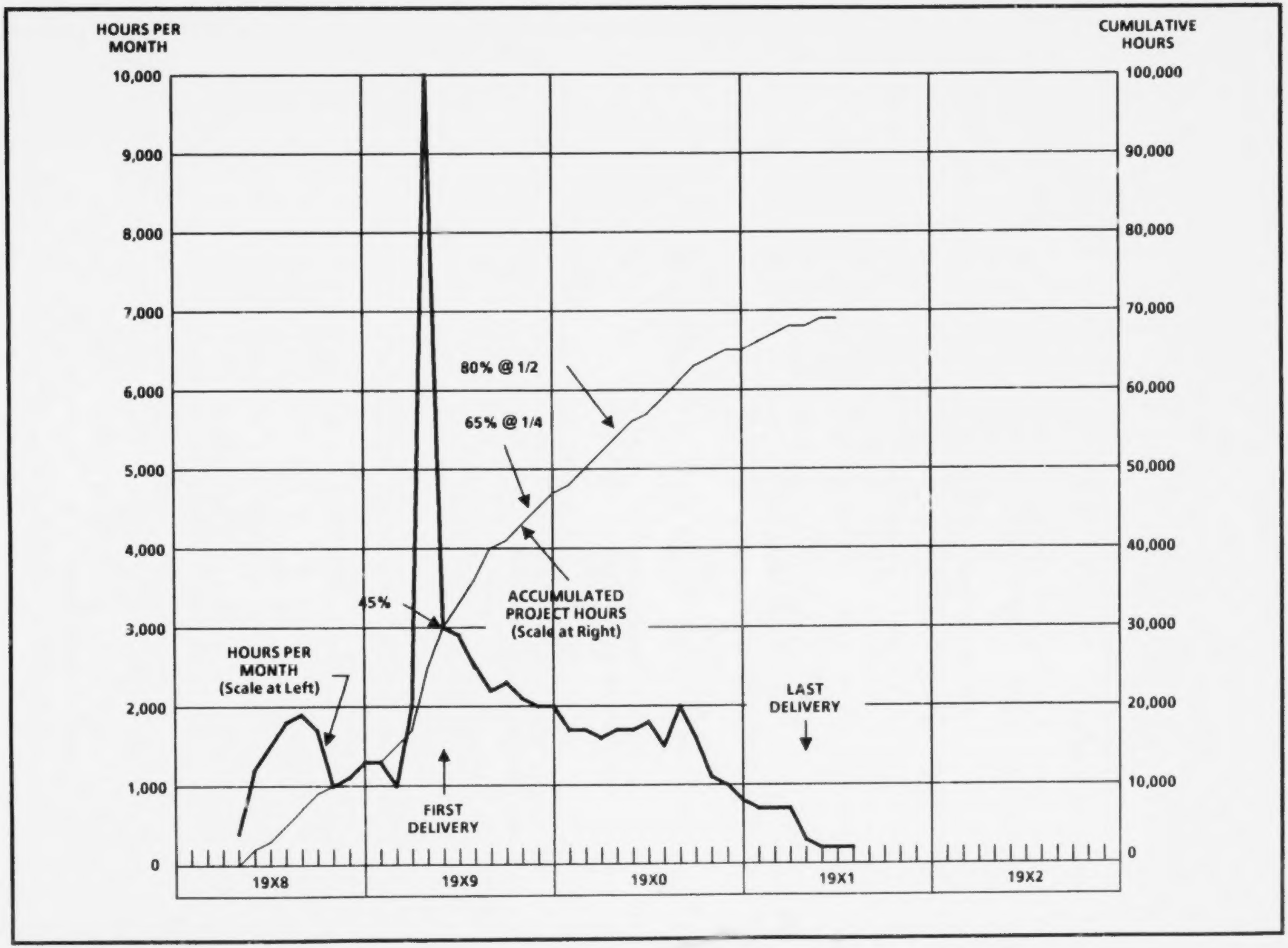
In addition to these overall approaches, you must continue to ask questions about anything that is not clear or needs amplification. For instance, several areas in the earlier example of direct engineering labor cost information obviously need analysis. How was the estimate of three hours per drawing arrived at for each of the three separate tasks? Why does each task require the same number of design and aeronautical engineers as drafting personnel? Why does the ratio of design to aeronautical personnel stay constant for each task? If Task 1 is 16 percent less complex than the earlier contract, why is the same ratio of design engineers to draftsmen required? The less complex design requirements should require less effort.

Summary questions

When you believe you have completed analyzing direct engineering labor, ask yourself the following questions:

a. Is the engineering labor estimate prepared in accordance with the contractor's estimating methods? Have the estimating methods been reviewed by Government personnel? Are the methods

FIGURE 5-4. ENGINEERING HOURS BY MONTH AND CUMULATIVE FOR PROJECT



consistent with cost accumulation practices? If they are, is the portion that relates to engineering labor acceptable?

b. Is the estimate broken down by specific engineering tasks describing the work to be performed? Is the level of engineer required to perform each task identified? Is the level commensurate with the task?

c. If the estimate covers tasks previously performed, is it supported by historical data? What do the data show? Has nonrecurring effort been identified? Is it treated properly?

d. If the estimate covers tasks not previously done, is it supported by historical data for similar tasks adjusted for differences in requirements?

e. Does the estimate for design engineering include redesign effort which, if it becomes necessary, would be priced separately?

f. If the estimate includes manufacturing engineering tasks for developing and implementing equipment and method improvements to increase productivity of direct factory workers, does the direct factory labor estimate reflect savings resulting from the engineering?

g. If the estimate includes manufacturing engineering tasks for development of advanced production technology, is that effort really necessary or would the current technology be just as efficient and less costly?

h. If the estimate includes reliability and maintainability tasks aimed at the manufacture of parts to meet these requirements, are the efforts duplicated under design engineering tasks?

i. If the estimate includes sustaining engineering, is all or any part of it duplicated under any of the tasks for other types of engineering effort?

j. If the estimate includes separate tasks for documentation, are the efforts duplicated in any design engineering tasks? Is the estimated documentation effort commensurate with the estimated design engineering effort? Is it commensurate with the documentation requirement?

k. If any part of the estimate is based on learning curves, is such an approach feasible? Should the estimate be developed or tested by alternate means?

5.4 Tooling

Tooling refers to special tooling, that is, jigs, dies, fixtures, and test equipment used in the production of end-items, and does not include machines, perishable tool items, or small hand tools.

In analyzing estimated tooling costs, the key question is what rate of production is planned for what period of time. The answer will establish if there will be hard or soft tooling, if the tooling bill will be limited to the production rate required under the proposed contract, or if it also anticipates production rates of future requirements. If the tooling plan anticipates future orders, these plans should be justified. Follow-on procurements always should be analyzed in light of the type and extent of tooling authorized by the Government on prior procurements.

There is an inverse relationship between the amount of tooling and the number of labor hours expended per unit of product. Because of this, it is extremely important that the contractor plan to use adequate tooling to minimize labor hours, but avoid tooling in excess of the needs of present and reasonably predictable future procurements.

Aside from this aspect, analysis of tooling is much like the analysis of any other cost. It requires evaluation of material, with special recognition of the fact that many contractors purchase all or a significant part of their basic tooling requirements. It also requires analysis of the labor hours, labor rates, and overhead rates applied to tooling. The following paragraphs discuss some particular points about tooling analysis.

Accounting treatment

Most contractors treat tooling costs as direct charges to a contract and include the costs as "Other Costs" in cost breakdowns. This treatment offers better visibility and makes it easier to control these nonrecurring expenses. In most procurements you should expect to see the tooling and other start-up costs amortized against the units of the first production contract. Stated another way, tooling costs generally will not be carried over and charged against quantities on follow-on contracts or against other than end-items. This does not include the costs of tooling maintenance and new tooling made necessary by design changes. These costs may be charged against follow-on contracts that use the tooling.

Like all general rules, there are exceptions, situations in which it is advantageous to let the contractor write off tooling and other nonrecurring costs over an estimated production quantity greater than the current, first requirement. If the estimated costs are identified and judged reasonable, and if the basis for the write-off is known to be reasonably firm (for example, estimated tooling and other start-up costs, $45,000; estimated total sales, all customers, 5,000 units over five years; per unit charge, $9; first year's Government requirement, 400 units; Government's first year share $3,600), and judged realistic, you can agree to amortize the costs over the total expected quantity. The company accepts a real cost responsibility under such an arrangement. It should have a lively interest in keeping the recurring (variable) costs down to help sell at least the estimated quantity and keep the nonrecurring costs within the estimate.

Tooling costs also may be treated as overhead. While this treatment may not be as precise as direct costing, it is a sound method for estimating and accounting for the cost. If experience can be used to demonstrate that the treatment does not create inequities, it may be accepted.

In addition, some companies treat recurring tool maintenance and replacement costs as charges to overhead. If so, the company will project the tooling maintenance factor based on experience. In analyzing such a factor, be sure that nonrecurring items are not included and compare the projection with the history for the past several years to get a better picture of the average and the trend.

Estimating and analyzing tooling costs

Tooling may require both engineering and manufacturing labor. You should expect to find tool engineering hours estimated using techniques appropriate to product engineering, and tool manufacturing estimated using techniques appropriate to product manufacturing.

The support for tooling hours incorporated in an estimate varies from actual detailed estimates on the specific tools required to a very broad approach in which the total tooling cost is estimated in relation to weight or size of the product. The latter method is used rarely. Where it is used, it should be based on sound statistics developed from historical costs. This approach is warranted only when nothing more specific or more realistic is available.

When the design of an item has begun to take shape and it is possible to rough in the manufacturing methods to be used, you can use more precise estimating methods. One way would be to estimate, as closely as possible, the kinds and numbers of tools that will be required and the number of labor hours needed to manufacture that amount of tools. If this method has been used, you will want to check out the basis for the estimate of the number of tools.

The support for these quantity assumptions might be an average expectation based on either histories of prior projects or historical averages modified to cover additional tooling requirements caused by complexities of the product, or, conversely, lesser tooling requirements occasioned by improved manufacturing methods and techniques. The number of tools required may have been developed by contractor tooling personnel breaking down the end-item by parts and by manufacturing and assembling operations on each part. After verifying the assumptions on type of tooling and the production rate planned, you should compare the estimate with historical actuals on prior projects.

Even if the contractor has prepared detailed estimates on each tool, a detailed review usually takes too much time to be practical. However, you need to understand the estimating procedure used and to review the estimating of selected items. When adequate historical information on prior projects is available or can be acquired, use it to evaluate the realism of estimated tooling hours, regardless of how they may have been estimated.

The graphic review techniques discussed in Section 5.3, relating incurred hours at specific times in a project to total hours for the project, can be useful in analyzing estimated tooling hours.

You should determine the extent to which tooling from prior or concurrent contracts may be available for use so you can avoid duplications in the estimate. If the contractor is purchasing tooling outside and is using purchase order prices in developing the estimate, determine whether the prices are firm. If they aren't, estimate what the contractor will ultimately pay.

As a further check, remember that one purpose of tooling is to decrease costs by reducing direct labor hours. Consequently, if a review of tooling hours indicates an estimate higher than normal requirements, compensating reduction should show up in the estimate of direct labor hours, both in initial manufacturing and rework required.

Special test equipment may present a unique problem. While it may be proper to treat it in the same manner as jigs, dies, and fixtures, the test equipment may be standard or modified standard commercial equipment. Consider asking the contractor to capitalize the equipment if the dollars are of a magnitude normally capitalized.

5.5 Other Costs

There are times when it makes good sense to charge directly a cost that is usually treated as an overhead expense. There are also certain efforts that some companies treat as indirect expense and others classify as direct. This section talks about both.

Examples of "other costs" are special insurance, special travel expenses, preservation packaging and packing, plant rearrangement, start-up costs, consultant's fees, certain clerical salaries, shop supplies, transportation costs, plant protection, royalties, computer expenses, and telephone and telegraph expenses.

This section also covers Federal excise taxes and royalties. They are very similar and the general discussion on "other costs" applies to them as well.

If the company usually treats a cost as an indirect expense, you first should determine the need for special treatment and then determine the need for incurrence and the reasonableness of the amount. You should be sure that the company's accounting and estimating practices provide consistent treatment of these special costs during the period under review. To prevent duplication, you should establish that when these items of expense are treated as direct charges, similar costs are excluded from overhead applied to the estimate. CASB Standard 402 covers this situation.

When the proposed contract is subject to cost accounting standards, the contractor must comply with disclosed or established practices and the requirements of applicable standards. If a change is made to the contractor's disclosed or established practice, the change must be processed in accordance with the Cost Accounting Standards clause and FAR.

Special treatment might be required when costs are much greater than the amounts usually incurred for the type of expenditure. Unusually high and one-time costs that would temporarily distort the overhead account would have an adverse effect on the rest of the company's operations, particularly its backlog of fixed-price business and the products it sells competitively. The decision to allow special treatment should be made only after checking with the auditor about Standard 402 and the contractor's disclosure statement or accounting system.

The second category of "other costs," those that some companies treat as direct charges and others handle as indirect, can be explained rather simply. For example, variations in the treatment of preservation packaging and packing costs generally can be explained by differences in products, proportion of spare parts business, organization and management concepts, and, quite obviously, by tradition.

General practice is to go along with the company in its costing of these efforts as long as the treatment is consistent, is in accordance with generally accepted accounting principles and practices appropriate to the particular circumstances, and results in an equitable distribution among the different products sold.

Preproduction costs

Preproduction (start-up) costs were discussed in some detail in the sections on engineering and tooling. Because this category of expense will usually be treated as a direct charge, special problems arising from the accounting treatment are reviewed here.

Cost analysis should identify any amounts for preproduction included in estimates supporting proposals. Negotiation should include definition of the cost included in this category and mutual understanding of how the items of expense included in preproduction costs will be treated.

Occasionally, there may be a sound reason for setting aside a portion of preproduction costs for allocation to later procurements of additional quantities of end-items or to spare parts, special handling equipment, and special tools and test equipment to be ordered later. An agreement to defer any amount of preproduction costs should be worked out carefully so that it does not result in an unintended advantage to the contractor.

For example, if, in a competitive situation, one contractor quotes on the basis of deferring a substantial portion of estimated start-up cost and all others quote on the basis of full allocation of this expense to the first contract, the one contractor would be in a very advantageous position unless the deferred cost were identified and all contractors were placed on a comparable basis for evaluation purposes.

Take another situation, one where the commercial potential of the item being procured is such that it is agreed to defer some portion of start-up costs to later write-off. If there is not a clear understanding of the maximum amount being deferred, the contractor would be in a position to claim consideration of an excessive amount of preproduction expenses in later procurements.

Consequently, in the occasional situations where preproduction costs are deferred and agreements are made on the treatment of these costs, a detailed record must be made of the amount involved and the intent of the parties. This record will guide those who are responsible for later pricing actions.

Stating this another way, a negotiator of a follow-on procurement should never consider including any deferred basic engineering or tooling identified as preproduction costs without assurance from the original contracting officer that such consideration has been anticipated and previously agreed upon.

Cost information

FAR Table 15-2 says in regard to the breakdown for other costs, "List all other costs not otherwise included in the categories described above (e.g., special tooling, travel, computer and consultant services, preservation, packaging and packing, spoilage and rework, and Federal excise tax on finished articles) and provide bases for pricing."

This is a catchall category for showing those costs not provided for elsewhere. The kind of procurement (supply or service) is the primary factor influencing the costs included in this category. In both, however, the variation among companies will be controlled by their normal accounting practice, by whether the cost is a direct charge or carried within an indirect expense account.

The following Example 17 assumes continuous production. Requirement is for 2,000,000 wingetts to be delivered over 10 months at a rate of 200,000 per month.

Example 17 – Other Costs

Table 5-18 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 5-18

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Other costs	$118,700	$.05935	Schedule F

The offeror's submission, as shown in the reference column in Table 5-18, includes a schedule supporting the $118,700 for other costs. This is reproduced here as Schedule F (Table 5-18A).

Schedule F

TABLE 5-18A

	TOTAL COST	REFERENCE
Molds	$ 16,700	1
Test equipment	2,000	2
Packaging & packing	100,000	3
Total	$118,700	
Unit	$0.05935	

1. *Molds.* 1,000 molds required for production rate. One mold will produce 10 units per eight-hour day, 200 units per month. Life expectancy is 6,000 units per mold. Each mold will produce 2,000 units under the contract; this is one-third life expectancy. Each mold costs $50, making the total $50,000 for the 1,000 needed. One-third of $50,000 is $16,667. The mold cost is from current vendor quotations maintained in purchasing department files. Production rate and life expectancy are experienced averages for the year ending 19X2.

2. *Test equipment.* Two M-4 testers are rented at an annual cost of $1,200 each. Rental agreement is filed in the purchasing department. These testers are used only on wingett production. Ten months cost ($2,000) charged to this procurement.

3. *Packaging and packing.* Costs are charged at 8 percent of total manufacturing costs based on the average experienced for the year 19X2. In the first three months of this year, the rate has gone from 8 percent to 5 percent but this was caused by accelerated delivery of a delinquent spare parts backlog, now completed. Rate is expected to return to the range of 7.1 to 9 percent experienced in 19X2 and earlier years.

Example 18 – Other Costs

Table 5-19 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 5-19

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Other costs	$35,000	–	Schedule C

The offeror's submission, as shown in the reference column in Table 5-19, includes a schedule supporting the $35,000 for other costs. This is reproduced here as Schedule C (Table 5-19A).

Schedule C

TABLE 5-19A

	TOTAL COST	REFERENCE
Operating expense	$10,000	1
Tires and tubes	5,000	2
Oil and grease	5,000	3
Equipment and rental	15,000	4
TOTAL	$35,000	

1. *Operating expense*. Proposed costs is based on average costs of $9,000 for the year 19X6, plus an additional $1,000 required by increased age of the equipment. The indicated repairs, over and above normal maintenance, are expected to be needed for the following equipment (Table 5-19B):

TABLE 5-19B

EQUIPMENT	REPAIR	ESTIMATED COST
Two trucks (2 each)	Overhaul	$500*
Generators (2 each)	Rewiring	$500*

*Based on quotes from AB Truck Service Co.

2. *Tires and tubes*. Proposed cost is based on average costs of $4,550 for the year 19X6 plus an additional $450, estimated as follows: 150,000 additional miles of operation are anticipated based on increased truck movements. We expect 100 more moves at an average of 1,500 miles per move. The experienced life of a tube is 5,000 miles and a tire, 10,000 miles. At this rate we'll need 30 more tubes and 15 more tires. Current prices from area dealer in tires/tubes are $5 each per tube and $20 each per tire. Using these figures, we get the following (Table 5-19C):

TABLE 5-19C

	NUMBER	UNIT	TOTAL
Tube	30	$ 5	$150
Tire	15	20	300
TOTAL			$450

3. *Oil and grease.* Proposed cost is based on average per plane consumption experienced in 19X2 as shown in tickets summarized on computer run 34-1687 in the accounting department. The average has been multiplied by the expected number of ships (per the RFQ) to be serviced.

4. *Equipment rental* (Table 5-19D).

TABLE 5-19D

TYPE	NUMBER	ANNUAL RENTAL
Portable hangar	2	$10,000
Gasoline trucks	6	5,000
TOTAL		$15,000

Five-year lease agreement with BACO dated January 1, 19X1 will be furnished on request.

Example 19 – Other Costs

Table 5-20 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 5-20

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Other costs	$14,000 rework at 2% of labor cost	–	Engineering

In this example, the offeror had no factual basis for its estimate. An explanation in the reference column is all that is needed to indicate this. However, where Standard 402 applies, the contractor will be required to accumulate actual rework costs.

Example 20 – Other Costs

The practice of charging travel and subsistence directly to the contract requiring travel is prevalent in contracts for nonpersonal services and for research. The following example illustrates how this might be explained when travel and subsistence is properly a direct charge. Table 5-21 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 5-21

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Other costs	$49,200	–	Note 3

The offeror's submission, as shown in the reference column in Table 5-20, includes a note supporting the $49,200 estimated for other costs. This is reproduced here as Note 3.

Note 3 - Other Costs:

These costs represent the travel and subsistence of research engineers required to inspect the operation of specialized test stands. Administrative travel has been included in indirect expense (see Table 5-21A).

TABLE 5-21A

Transportation:		
Travel to Wright-Patterson AFB, Ohio	$500	
Number of trips – 5x2 people each	x10	
		$5,000
Travel to Cape Canaveral, Florida	$300	
Number of trips – 10x4 people each	x40	
		12,000
Total transportation		$17,000
Subsistence:		
Wright-Patterson average stay 10 days		
@ $62 per day – 10x10 = 100x$62 =		$ 6,200
Cape Canaveral average stay 10 days		
@ $65 per day – 10x40 = 400x$65 =		26,000
Total subsistence		$32,200
Total other cost		$49,200

Transportation cost represents the lowest cost air fare currently prevailing plus estimated taxi fare to and from airports. Subsistence represents $58.00 per day plus daily transportation cost from motel to work location.

Evaluating other costs

As noted earlier, the first step is to make sure that these costs are not also included in the indirect expense pools or under other cost categories. Once you are sure they are classified properly, try to assess the overall reasonableness and applicability of the proposed costs.

For example, packaging and packing in the first example was proposed at $100,000 or five cents per wingett. The question to ask is "Should packaging and packing cost five cents per item?" To answer, you have to know the product and how it will be packaged. The 8 percent factor used may be realistic for other products, but if the requirement for this contract is to dump 40,000 wingetts in a barrel and ship them to your depot, it is highly doubtful that the five cent charge is right. The point is that no matter how many accounting records and how much experienced costs the contractor has, you must question the proposed costs if they don't make sense.

In the fourth example the contractor proposed $49,200 for travel. You should test the reasonableness of the number of trips and the number of people traveling by asking what they are to do and why. If you are satisfied that the trips and people are needed, then test the proposed duration of the travel. The air fares and subsistence costs can be verified easily.

Computer expenses can create problems. The hourly rate generally can be estimated reasonably and verified by audit, but the hours or minutes of computer time needed are difficult to establish. If you rely on history for computer time, make sure the contractor will use the same computer model on your work. Most newer computer models are considerably faster and more expensive. Don't make the mistake of multiplying DC-3 hours by jet plane rates.

The contractor may have used cost estimating relationships and factors instead of specific events in estimating these other costs. If so, you should evaluate the costs using correlation and ratio analyses.

Federal excise tax

The offeror's proposal should contain a statement about whether or not the proposed price includes excise taxes. If the proposal includes excise taxes, the offeror should be required to identify the amount of excise tax for each item.

Whenever excise taxes are included in an offeror's proposal, ask counsel for advice as to the propriety of the taxes.

Because most offerors will obtain an exemption certificate for a Federal excise tax, a specific illustration of how the item is identified would be superfluous. It is enough to remind you that all four of the basic questions should be answered:

a. What is it?

b. Where is it?

c. What does it represent?

d. How was it used?

Royalties

FAR Table 15-2 says, in regard to royalties:

> "Royalties -- If more than $250, provide the following information on a separate page for each separate royalty or license fee: name and address of licensor; date of license agreement; patent numbers, patent application serial numbers, or other basis on which the royalty is payable; brief description (including any part or model numbers of each contract item or component on which the royalty is payable); percentage or dollar rate of royalty per unit; unit price of contract item; number of units; and total dollar amount of royalties. In addition, if specifically requested by the contracting officer, provide a copy of the current license agreement and identification of applicable claims of specific patents. (See FAR 27.204 and 31.205-37.)"

Contractors generally pay royalties by virtue of license agreements. Many license agreements are not clear on their applicability to the items on the contract being negotiated. Unless the license agreement explicitly describes the item or items it covers, it is not adequate cost or pricing data.

The items of information detailed in the footnote are cost or pricing data and will be submitted when royalty payments are anticipated. The identification of cost or pricing data on royalties is much the same as for other cost elements.

Example 21 – Royalties

Table 5-22 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 5-22

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Royalties	$20,000	$20	Note 8

The offeror's submission, as shown in the reference column in Table 5-22, includes a note supporting the $20,000 estimated for royalties. This is reproduced here as Note 8.

Note 8 - Royalties:

Royalty costs of $20,000 represent payments required on license agreement with Paul Co., dated January 4, 19X5, for manufacture of part number 4687-492 (see drawing specifications 23-49234) covered by patent no. 26X74X1. The agreement requires payment of $20 per item for each of the 1,000 items required in the contract. A copy of this agreement has been submitted to the local ACO and to the Air Force JAG at Wright-Patterson AFB, Ohio. Our attorneys Nough, Stough and Moore, Cleveland, Ohio, can supply any additional information required.

Suggested Readings

FAR 15.806 Subcontract pricing considerations

An Introduction to Direct Cost Analysis, Rev. 1, 2 July 1973. A Basic "How-To" Guide for NAVSEC F-COG and S-COG Negotiated Production Procurements.

CHAPTER 6
How to Analyze Indirect Costs

CHAPTER 6

HOW TO ANALYZE INDIRECT COSTS

CONTENTS

6.1 Definitions 6- 2

6.2 Indirect Cost Information 6- 3

6.3 Overhead Examples 6- 5
    Material overhead 6- 6
    Engineering overhead 6- 8
    Manufacturing overhead 6-11
    General and administrative expense 6-14

6.4 Certified Cost or Pricing Data 6-17

6.5 Importance of Indirect Cost Pools 6-18

6.6 Indirect Cost Behavior 6-19
    The J. H. Williams method 6-22
    The standby cost method 6-22
    Graphic correlation 6-22
    Least squares 6-22

6.7 Budgeting and Controlling Indirect Costs 6-23
    Volume projections 6-24
    Functional organization 6-25
    Manpower costs 6-25
    Responsibility for control 6-26

6.8 Factory Overhead 6-26
    Assignment to contract 6-28
    Labor base 6-29

6.9 Engineering Overhead 6-29

6.10 General and Administrative (G&A) Expenses 6-29

6.11 Independent Research and Development and Bid Proposal Costs 6-30

6.12 Selling Expense 6-31

6.13 Volume Projections 6-31

6.14 Indirect Cost Projections 6-32

6.15 Teamwork 6-33

Indirect costs are sometimes called "overhead" or "burden." These plantwide costs are allocated to contracts or other cost objectives. This treatment contrasts with that of direct costs, which can be and are identified specifically for each contract. Indirect costs represent supporting effort to the main business of the company. They are accumulated periodically and prorated to work performed in-plant during that period.

Indirect costs are significant in amount, and they demand constant attention if the company is to control them effectively. They are significant because they are a substantial portion of the total in-plant costs of most defense contractors. The need for control is based on this significance and the fact that many indirect efforts are discretionary in nature; they can be reduced or eliminated if conditions warrant.

This chapter defines indirect costs, explains the data to be submitted with a pricing proposal [SF 1411 and supporting information as set forth in Federal Acquisition Regulation (FAR) Table 15-2], and gives several examples of typical displays of cost information. It comments on the special nature of overhead and explains the importance of indirect costs in terms of dollars, control, and the common attitude that overhead is *too high*. It explains overhead cost behavior in terms of the kinds of costs included: fixed, variable, and semivariable (or semifixed). Budgeting and control of indirect costs are discussed in detail as primary responsibilities of company managers. The chapter concludes with how to analyze indirect costs and how to evaluate volume forecasts and cost projections.

6.1 Definitions

The *total cost* of a contract is the sum of allowable direct and indirect costs allocable to the contract, incurred or to be incurred, less any allocable credits. A *direct cost* is any cost that is specifically identified with a particular final cost objective. A *final cost objective* is one to which both direct and indirect costs are allocated (e.g., a project or a contract). An *indirect cost* is any cost not directly identified with a single final cost objective. It is identified with two or more final cost objectives or with at least one intermediate cost objective later allocated to final cost objectives.

For practical reasons, minor efforts that could be treated as direct costs often are classified and handled as indirect costs. However, all costs incurred for the same purpose and in like circumstances are either direct costs only or indirect costs only with respect to final cost objectives.

No final cost objective will have any cost allocated to it as an indirect cost if other costs incurred for the same purpose, in like circumstances, have been included as a direct cost of that or any other final cost objective. Similarly, no final cost objective will bear any cost as a direct cost if other costs incurred for the same purpose, in like circumstances, have been included in any indirect cost pool to be allocated to that or any other final cost objective.

Indirect costs represent supporting effort to the main business of the company but cannot be directly assigned to individual projects or contracts. These costs should be accumulated by logical cost groupings or pools with due consideration of the reasons for incurring the costs. Manufacturing overhead, engineering overhead, and general and administrative (G&A) expense commonly are grouped separately. It also is common to find separate overhead pools for material, tooling, selling, and offsite labor. Overhead pools may be set up on a companywide basis or may be accumulated by division, plant, department, or cost center. Practical considerations should govern the number and composition of the groupings.

Analysis of overhead is largely a question of trend analysis, with costs adjusted to measure the reasonableness of past, present, and future overhead dollars. This analysis includes a determination of:

a. The overhead dollars the company has been incurring and the reasonableness of and necessity for continued expenditures at that level.

b. The base to which the overhead has been applied and the degree to which the base will or should change in the future period of contract performance.

c. The overhead dollars that should be in the contract price objective, as derived on the basis of information developed in a and b.

As a rule of thumb, if the base is increasing, the overhead rate should be decreasing. Conversely, if the base is decreasing, the overhead rate generally will be increasing. However, don't accept this concept blindly.

With declining volume, you want to know that company management is reducing indirect costs as rapidly as prudent judgment dictates. With proper management, all costs are controllable to some degree. The challenge in analyzing indirect costs is to place events in the proper time perspective before deciding what, if any, changes to existing overhead levels would be appropriate in the period of contract performance.

Your analysis of overhead has two aspects. One is to evaluate the projected overhead dollars to determine reasonableness, necessity for proposed expenditures, and allocability to Government work. The other is to review the basis of allocation to Government work to establish the reasonableness of allocation methods. The allocation method used should give the fairest assignment of overhead possible under the circumstances.

You normally will accept the contractor's established practices if they are in accord with generally accepted accounting principles and do not conflict with any cost accounting standards. However, you may need to take another look at those practices when any substantial difference occurs between the patterns of work under a particular contract and other work of the contractor, or when any significant change occurs in the nature of the business, the extent of subcontracting, fixed asset improvement programs, inventories, the volume of sales and production, manufacturing processes, the contractor's product, or other relevant circumstances.

6.2 Indirect Cost Information

The contract pricing proposal submitted by the SF 1411 is to be prepared in a format consistent with the offeror's cost accounting system. The proposal is to include supporting breakdowns, as appropriate, for each cost element. The instructions (FAR 15.804-6(b) and FAR Table 15-2) require the following for indirect costs:

> Indicate how the offeror has computed and applied offeror's indirect costs, including cost breakdowns, and showing trends and budgetary data, to provide a basis for evaluating the reasonableness of proposed rates. Indicate the rates used and provide an appropriate explanation.

Those instructions also require:

> If agreement has been reached with Government representatives on use of forward pricing rates/factors, identify the agreement, include a copy, and describe its nature.

The offeror must submit all required cost or pricing data to the contracting officer, either actually or by specific identification in writing. The offeror must include an index in the submission. The index will reference all the cost or pricing data accompanying or identified in the proposal. As a result of these requirements, you should have a reasonable identification of overhead cost elements, usually the indirect cost pools used in the offeror's cost accounting system, with explanations.

Although each situation is unique, the following illustrate the kinds of information you should have. The illustrations are related to the FAR instructions already cited.

"Indicate how offeror has computed and applied offeror's indirect costs, ..." -- An appropriate explanation of this point will give you the method by which the offeror allocated a portion of estimated total indirect cost to the proposed contract. Proposed overhead expenses usually result from the application of an estimated overhead rate to a given element of cost (e.g., labor dollars), a group of costs (e.g., cost of material), labor man-hours, or some other appropriate base. The rate to be used is developed by dividing the total estimated indirect costs by the total estimated cost in the base.

This process results in a ratio (usually expressed as a percentage of indirect dollars to direct dollars or dollars per hour of labor). The offeror should indicate the base(s) over which the related indirect costs are to be spread. The portion of the base that will be incurred in performing the proposed contract, multiplied by the rate that has been developed as described above, should equal the overhead expense proposed.

". . . including cost breakdowns . . . ." -- The offeror should furnish a breakdown, by category or element of cost, of all the indirect expenses that will be allocated to the contract. An offeror that submits several proposals during a relatively short period, doesn't have to submit the same detail with every proposal. A statement that (1) the overhead rates are predicated on the supporting documents previously submitted and (2) no significant changes have occurred that would alter them will fulfill this requirement. The data previously submitted should be specifically identified by the reference to the proposal, change order, or contract.

". . . showing trends and budgetary data . . . ." -- The offeror should provide a comparison of indirect expenses and base(s) for prior periods with those *during* the period of contract performance. A scatter-chart or graph plotting the actual level of indirect expenses at various volumes also may be used to indicate a trend and to support the reasonableness of the forecasted level of indirect expense.

If the forecasted indirect expenses are predicated on a budget, the date of the budget should be specified. Also, a reference should be made to the contractor's policies and procedures on budget preparation. Any significant differences between the budgeted indirect expenses and those forecasted to be incurred during the period of contract performance should be explained, as should any significant variations in the amount of the budgeted and proposed base.

"Indicate the rates used . . . ." -- The factor used to allocate overhead costs to the proposed contract effort will be identified, either on the face of the proposed contract estimate or in the cost or pricing data supporting that estimate. The factor usually will be expressed as a dollar amount per hour or as a percentage of some other cost.

"Material overhead -- 10% - $39,375."

or

"Material overhead rate is 10% of the estimated material cost of $393,752."

or

"Manufacturing overhead is estimated at $9.80 per machine hour."

". . . provide an appropriate explanation." -- This is the heart of the requirement. You have to know a lot more than just the rate. The offeror will have to explain how the rate was developed and what was used as the base for computing it. The explanation will be the cost or pricing data and will use both words and figures. You will have to analyze them and reach an understanding with the offeror.

Whether the offeror actually submits the detailed cost or pricing data to you or merely identifies them, whether the offeror keeps them in the files or turns them over to the administrative contracting officer (ACO) or the auditor, or makes whatever other special distribution you may agree to, will depend on many factors. Size of the procurement, number and frequency of proposals being made and negotiated, existence of a forward pricing rate agreement, and location of ACO and auditor in relation to the offeror's plant are some factors.

". . . agreement . . . on use of forward pricing rates/factors . . . ." -- The offeror should advise you of any existing agreement on the use of forward pricing rates with any contracting officer or the authorized representative of any contracting officer. Complete details of the agreement should be submitted, if not already on file with the buying activity, and any restrictions on the use of the rates and the rights of the parties to terminate the agreement should be highlighted. This does not mean that you need to get all the detail that the contracting officer received, but you will need at least a description of what was received. Further, the offeror should identify the Government representative with whom the agreement was reached, the date of the agreement, and the period of contemplated use of the rates.

This identification does not relieve the contractor of the responsibility to disclose and identify current cost or pricing data that differ significantly from the data furnished for the last previous rate agreement. A contractor is not required to certify data when negotiating forward pricing rates, but the certificate signed in connection with a particular contract covers the forward pricing data described in the proposal for that contract.

6.3 Overhead Examples

For ease of presentation, these examples will show recorded costs for two years and forecasted costs for one year. The data will be for a consecutive three-year period. The experienced costs for the second year are, in reality, actuals for 10 months combined with the budget figures for the other two months.

In addition, the two-year actual figures and one-year forecast may not be realistic. Depending upon the size and complexity of the procurement, this information may not be enough to develop an indicative trend or enough of a projection to cover the life of the contract. Thus, in practice, if you can anticipate needing more history, get it by asking for it in the solicitation. If a longer projection period is indicated, the offeror should have used it in preparing the proposal.

Material overhead

Material overhead normally includes the costs related to operating the purchasing department, incoming transportation, receiving and inspection, and handling and storage of materials. The most common method of allocating these costs to a particular contract is on the basis of material charged to a contract. However, there are other acceptable methods. In many instances, the indirect costs related to material are not segregated from other overhead pools. Naturally, if such costs are included in these other overhead pools, no material overhead costs should be shown.

We have two examples of submissions that would fulfill FAR requirements. The second example represents an instance where prior agreement has been reached on the overhead rates used. A word of caution: even though the overhead rates have been approved, the amount of overhead costs may not be acceptable. Any change in the costs or hours to which the rates are to be applied will result in a different overhead amount.

Example 1 - Material Overhead

Table 6-1 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 6-1

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE - TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE - UNIT COST (3)	REFERENCE (4)
Material overhead	$149,910	$99.94	Attachment 5

The offeror's submission, as shown in the reference column in Table 6-1, includes an attachment supporting the $149,910 material overhead estimate. This is reproduced here as Attachment 5

Attachment 5:

Material overhead was computed by applying a 5.7% rate to the contract material costs estimated to be incurred in 19X5. The estimated material costs for the 12 months ending December 31, 19X5 were computed in accordance with our standard budgetary procedure No. 25 dated January 15, 19X1. In accordance with our established accounting procedures in effect on November 20, 19X4, material overhead is allocated to individual contracts on the basis of material costs charged to each contract.

The attached Exhibit 1, a breakdown of cost elements included in the material overhead pool, represents the ending balance recorded in our books of account as of the close of the accounting period in calendar years 19X3 and 19X4 (except that 19X4 is a combination of actual and budget figures). The details supporting the estimated overhead costs for the year 19X5 are available in the supporting documentation to our 19X5 budget, prepared December 15, 19X4 and may be examined in the office of our comptroller.

EXHIBIT 1 – MATERIAL OVERHEAD

ACCOUNT TITLE	YEAR ENDED DEC 31, X3	YEAR ENDED DEC 31, X4*	PROJECTED YEAR ENDING DEC 31, X5
Salaries and Wages:			
Indirect Labor	$ 823,833	$ 864,327	$ 1,125,500
Additional compensation	31,000	34,392	41,225
Overtime premium	5,010	5,263	5,500
Sick leave	20,768	22,018	33,750
Holidays	26,812	28,100	41,340
Suggestion awards	15	125	150
Vacations	43,607	45,734	56,250
Outside Services:			
Maintenance	165	192	200
Other	78	76	75
Personnel Expenses:			
Compensation insurance	4,155	4,409	5,625
Unemployment insurance	13,361	14,871	15,500
FICA tax	19,068	19,542	25,450
Group insurance	38,003	39,847	55,700
Travel	37,741	36,535	37,500
Dues and subscriptions	651	651	651
Employee pension fund:			
Salary	16,198	16,694	17,200
Hourly	9,870	10,423	13,500
Supplies:			
Operating supplies	12,460	13,733	15,000
Maintenance	234	423	450
Stationery, printing, and office supplies	10,210	10,162	10,750
Public Utilities:			
Telephone	19,184	20,322	21,500
Heat, light, and power	158,997	170,004	175,000
Fixed Charges:			
Depreciation	79,554	79,554	79,554
Total material overhead expense (A)	$ 1,371,074	$ 1,437,397	$ 1,777,370
Total direct material costs (B)	$25,878,940	$28,466,900	$31,313,600
Material overhead rate (A) ÷ (B)	5.3%	5.0%	5.7%

*Includes budgetary estimate for last two months.

[This example constitutes minimum acceptable identification. However, to do a good pricing job, you probably would require a breakout of the December 31, 19X4 data into two columns, one for the 10-month actual, the other for the two-month estimate.]

The increase in material overhead costs reflects the increased number of inspectors needed to assure the quality of products received from our vendors as well as the general increases in salaries and wages and other costs.

Example 2 – Material Overhead

Table 6-2 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 6-2

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Material overhead	$2,054	$10.27	Note 6

The offeror's submission, as shown in the reference column in Table 6-2, includes a note supporting the $2,054 estimated for material overhead. This is reproduced here as Note 6.

Note 6:

Material overhead was computed by applying a 5.7% rate to the contract material costs estimated to be incurred in 19X5. This rate was agreed to on December 29, 19X4 by the administrative contracting officer assigned to our manufacturing division. This agreement stipulates that the agreed-upon overhead rate will be used by the contractor in new proposals and accepted by the ACO in locally negotiated procurements of less than $1 million during the first six-month period of calendar year 19X5. The agreement is subject to cancellation by either party with 30 days written notification. Details supporting the rates were submitted to the ACO and also are available from the comptroller at the manufacturing division.

Engineering overhead

Two examples of the submission of data supporting engineering overhead costs follow. Example 1 is a case in which the offeror has not submitted data previously to support the overhead rates. The second example is a case in which such data have been submitted previously.

Example 3 – Engineering Overhead

Table 6-3 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 6-3

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Engineering overhead	$13,332.90	$533.32	Attachment 6

The offeror's submission, as shown in the reference column in Table 6-3, includes an attachment supporting the $13,332.90 estimated for engineering overhead. This is reproduced here as Attachment 6.

Attachment 6:

SUMMARY

	FY 19X3	FY 19X4*	PROJECTED FY 19X5
Engineering overhead (see Exhibit 1) (A)	$63,248,444	$64,029,901	$68,583,390
Engineering labor (direct) (B)	$57,663,906	$58,897,247	$67,731,834
Engineering overhead rate (A) ÷ (B)	109.7%	108.8%	101.2%

*Includes budgetary estimate for last two months.

The estimated engineering overhead costs for the year ending December 31, 19X5 were computed in accordance with our standard budgetary procedure No. 25 dated January 15, 19X1. In accordance with our established accounting procedures in effect as of November 20, 19X4, engineering overhead is allocated to individual contracts in proportion to the amount of direct engineering labor dollars charged to each contract.

The attached Exhibit 1, a breakdown of engineering overhead costs for the year 19X3 and 19X4, represents the ending balances of these accounts as recorded in our books for the respective accounting periods (except that 19X4 is a combination of actual and budget figures). The decrease in engineering overhead rates from those experienced in previous years is predicated on an expected increase of engineering activity as reflected in the projected increase in engineering direct labor dollars. The details supporting the estimated overhead costs, by element, are available in the supporting documentation to our 19X5 budget, prepared December 15, 19X4. These records are located in the office of our comptroller.

EXHIBIT 1 - ENGINEERING OVERHEAD

ACCOUNT TITLE	YEAR ENDED DEC 31, X3	YEAR ENDED DEC 31, X4*	PROJECTED YEAR ENDING DEC 31, X5
Indirect Salaries and Wages:			
Engineering salaries - indirect	$13,193,438	$13,417,362	$14,759,098
Blueprinting	744,419	749,619	824,581
Shop supervision	3,223,859	3,227,622	3,550,384
Shop clerks & timekeepers	608,583	601,921	632,881
Tool crib	941,502	1,019,123	1,071,074
Training	845,191	819,445	822,416
Watchmen and janitors	833,079	798,419	800,215
Receiving and inspection	416,613	420,420	442,130
Maintenance, building & grounds	245,947	202,199	226,419
Machinery and equipment	2,314,142	2,540,111	2,667,166
Plant rearrangement	1,247,312	1,250,505	1,301,787
Field installation	1,126,787	1,009,998	1,100,216
Purchasing	768,888	789,897	868,886
Vacation expense and holiday pay	4,830,012	4,841,233	5,325,356
Other indirect	772,205	762,756	720,845
Subtotal	**$32,111,977**	**$32,450,630**	**$35,113,454**
Supplies and Expense:			
Engineering supplies and expense	$ 1,315,725	$ 1,619,740	$ 1,781,714
Engineering blueprinting	240,254	272,181	299,399
Traveling expenses	2,147,062	2,221,416	2,271,004
Shop supplies	2,267,490	2,416,721	2,537,557
Perishable tools	345,931	341,223	358,284
Insurance & misc. taxes	635,069	637,721	604,918
Group insurance premiums	1,977,173	2,001,122	2,201,234
FICA, unemployment and work compensation	3,753,582	3,799,002	4,178,902
Rent	605,376	607,116	607,116
Training	265,533	260,011	260,011
Maintenance, building & grounds	305,408	279,419	279,419
Machinery & equipment	2,409,725	2,391,716	2,511,301
Purchased water and gas	350,903	350,671	350,671
Plant rearrangement	1,491,788	1,588,997	1,590,202
Purchased power & light	1,655,967	1,672,419	1,756,040
Depreciation	3,055,743	2,972,446	2,972,446
Experimental hangar and field expense	208,639	117,921	198,214
Group annuity premium	6,469,635	6,500,175	7,150,193
Manufacturing services	1,755,941	1,666,778	1,698,835
Income from scrap sales and cafeterias	(124,183)	(141,725)	(141,725)
Sundry engineering expense	3,706	4,201	4,201
Subtotal	**$31,136,467**	**$31,579,271**	**$33,469,936**
Total engineering overhead	$63,248,444	$64,029,901	$68,583,390

*Includes budgetary estimate for last two months.

[This example constitutes minimum acceptable identification. However, to do a good pricing job, you probably would require a breakout of the December 31, 19X4 data into two columns, one for the 10-month actual and the other for the two-month estimate.]

Example 4 – Engineering Overhead

Table 6-4 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 6-4

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Engineering overhead	$18,975	$1,265	Note 6

The offeror's submission, as shown in the reference column in Table 6-4, includes a note supporting the $18,975 estimated for engineering overhead. This is reproduced here as Note 6.

Note 6:

This amount was computed by applying a 101.2% rate to the direct engineering labor dollars estimated to be incurred in performance of this contract.

The above rate was agreed to on December 20, 19X4 by the administrative contracting officer assigned to our manufacturing division. This agreement stipulates that the agreed-upon overhead rate will be used by the contractor in new proposals and accepted by the ACO in locally negotiated procurements of less than $1 million during the first six-month period of calendar year 19X5. The agreement is subject to cancellation by either party with 30 days written notification. Details supporting the rates were submitted to the ACO and also are available from our comptroller.

Manufacturing overhead

Two examples of the submission of data supporting manufacturing overhead costs follow. Example 1 is a case in which the offeror has not submitted data previously to support the overhead rates. The second example is a case in which such data have been submitted previously.

Example 5 – Manufacturing Overhead

Table 6-5 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 6-5

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Manufacturing overhead	$91,688	$2,292.20	Attachment 7

The offeror's submission, as shown in the reference column in Table 6-5, includes an attachment supporting the $91,688 estimated for manufacturing overhead. This is reproduced here as Attachment 7.

Attachment 7:

SUMMARY

	FY 19X3	FY 19X4*	PROJECTED FY 19X5
Manufacturing overhead (see schedule) (A)	$3,416,816	$3,545,336	$3,979,858
Manufacturing labor (B)	$1,340,887	$1,407,931	$1,267,200
Manufacturing overhead rate (A) ÷ (B)	254.8%	251.8%	314.1%

*Includes budgetary estimate for last two months.

The estimated manufacturing overhead costs for the year ending December 31, 19X5 were computed in accordance with our standard budgetary procedure No. 25 dated January 15, 19X1. In accordance with our established accounting procedures in effect as of November 20, 19X4, manufacturing overhead is allocated to individual contracts in proportion to the amount of direct manufacturing labor dollars charged to each contract.

The attached Exhibit 1, a breakdown of manufacturing overhead costs for the years 19X3 and 19X4, represents the ending balance of these accounts as recorded in our books for the respective accounting periods, except that 19X4 is a combination of actual and budget figures. The increase in manufacturing overhead rates from those experienced in previous years is due principally to the acquisition of automated milling machines with an accompanying decrease in direct labor. The details supporting the estimated overhead costs, by element, are available in the supporting documentation to our 19X5 budget, prepared December 15, 19X4. These records are available in the office of our comptroller.

EXHIBIT 1 – MANUFACTURING OVERHEAD

ACCOUNT TITLE	YEAR ENDED DEC 31, X3	YEAR ENDED DEC 31, X4*	PROJECTED YEAR ENDING DEC 31, X5
Salaries and Wages:			
Indirect labor	$1,338,330	$1,395,245	$1,472,160
Additional compensation	80,302	83,950	88,000
Overtime premium	13,214	11,296	4,500
Sick leave	65,575	67,742	72,130
Holidays	79,164	83,006	87,080
Suggestion awards	310	423	500
Vacations	140,272	147,891	154,300
Personnel Expense:			
Compensation insurance	25,545	26,304	27,500
Unemployment insurance	50,135	52,692	51,500
FICA tax	70,493	73,907	77,850
Group insurance	153,755	161,401	169,130
Travel expense	11,393	12,725	13,900
Dues and subscriptions	175	175	175
Recruiting and relocation – new employees	897	574	250
Relocation – transferees	4,290	3,562	1,825
Employees pension fund:			
Salary	25,174	26,350	27,500
Hourly	62,321	65,497	64,200
Training, conferences and technical meetings	418	539	575
Educational loans and scholarships	400	400	400
Supplies and Services:			
General operating	495,059	509,839	545,000
Maintenance	9,102	12,318	15,700
Stationery, printing, and office supplies	23,052	24,125	25,500
Material O/H on supplies	56,566	62,071	62,500
Maintenance	9,063	10,875	15,000
Rearranging	418	3,523	500
Other	3,314	2,635	2,500
Heat, light, and power	470,946	489,123	517,200
Telephone	32,382	33,874	35,000
Fixed Charges:			
Depreciation	187,118	175,641	439,850
Equipment rental	7,633	7,633	7,633
Total manufacturing expense (A)	**$3,416,816**	**$3,545,336**	**$3,979,858**
Total manufacturing direct labor dollars (B)	**$1,340,887**	**$1,407,931**	**$1,267,200**
Manufacturing overhead rate (A) ÷ (B)	254.8%	251.8%	314.1%

*Includes budgetary estimate for last two months.

[This example constitutes minimum acceptable identification. However, to do a good pricing job, you probably would require a breakout of the December 31, 19X4 data in two columns, one for the 10-month actual, the other for the two-month estimate.

Example 6 – Manufacturing Overhead

Table 6-6 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 6-6

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
Manufacturing overhead	$24,340	$978	Note 8

The offeror's submission, as shown in the reference column in Table 6-6, includes a note supporting the $24,340 estimated for manufacturing overhead. This is reproduced here as Note 8.

Note 8:

This amount was computed by applying a 314.1% rate to the manufacturing direct labor dollars estimated to be incurred in 19X5 in performance of this contract.

The above rate was agreed to on December 20, 19X4 by the administrative contracting officer assigned to our manufacturing division. This agreement stipulates that the agreed-upon overhead rate will be used by the contractor in new proposals and accepted by the ACO in locally negotiated procurements of less than $1 million during the first six-month period of calendar year 19X5. The agreement is subject to cancellation by either party with 30 days written notification. Details supporting the rates were submitted to the ACO and also are available from our comptroller.

General and administrative (G&A) expense

Presented below are two examples of the submission of data supporting general and administrative expense costs. Example 1 is a case in which the offeror has not submitted data previously to support the G&A rate. The second example is a case in which such data have been submitted previously.

Example 7 – General and Administrative Expense

Table 6-7 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 6-7

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
General and administrative expenses	$44,100	$490	Attachment 10

The offeror's submission, as shown in the reference column in Table 6-7, includes an attachment supporting the $44,100 estimated for G&A expenses. This is reproduced here as Attachment 10.

Attachment 10:

SUMMARY

	FY 19X3	FY 19X4*	PROJECTED FY 19X5
G&A expenses (see Exhibit 1) (A)	$ 6,148,431	$ 6,089,195	$ 6,385,881
Manufacturing costs (B)	$70,993,247	$72,932,479	$73,549,800
G&A rate (A) ÷ (B)	8.7%	8.4%	8.7%

*Includes budgetary estimate for last two months.

The estimated general and administrative expenses for the year ending December 31, 19X5 were computed in accordance with our standard budgetary procedure No. 25 dated January 15, 19X1. In accordance with our established accounting procedures in effect as of November 20, 19X4, general and administrative expense is allocated to individual contracts in proportion to the amount of total manufacturing costs charged to each contract.

The attached Exhibit 1, a breakdown of general and administrative expenses for the years 19X3 and 19X4, represents the ending balances of those accounts as recorded in our books for the respective accounting periods, except that 19X4 is a combination of actual and budgetary figures. We anticipate no significant variation from previously experienced costs in the G&A expense area. The details supporting the estimated G&A costs, by element, are available in the supporting documentation to our 19X5 budget, prepared December 15, 19X4. These records are available in the office of the comptroller.

EXHIBIT 1 – GENERAL AND ADMINISTRATIVE EXPENSE

ACCOUNT TITLE	YEAR ENDED DEC 31, X3	YEAR ENDED DEC 31, X4*	PROJECTED YEAR ENDING DEC 31, X5
Salaries and Wages:			
Indirect labor	$ 1,407,100	$ 1,458,724	$ 1,460,500
Additional compensation	125,431	152,691	155,000
Overtime premium	4,883	5,069	5,000
Sick leave	34,875	32,937	32,500
Holidays	49,962	50,013	49,500
Suggestion awards	240	225	250
Vacations	80,637	81,398	82,525
Personnel Expense:			
Compensation insurance	1,025	1,103	1,200
Unemployment insurance	22,465	23,591	23,600
FICA tax	31,419	31,519	32,000

*See footnote at end of table.

EXHIBIT 1 – GENERAL AND ADMINISTRATIVE EXPENSE (Continued)

ACCOUNT TITLE	YEAR ENDED DEC 31, X3	YEAR ENDED DEC 31, X4*	PROJECTED YEAR ENDING DEC 31, X5
Personnel Expense: (Continued)			
Group insurance	29,008	29,226	29,300
Travel expense	62,513	64,987	67,000
Dues and subscriptions	2,375	2,119	2,500
Recruiting	1,378	1,075	1,250
Relocation – transferees	566	1,974	1,500
Employee pension fund:			
Salary	33,097	34,123	35,000
Hourly	17,632	17,956	18,500
Training, conferences, and technical meetings	7,003	7,581	7,500
Courtesy meal expense	6,238	5,436	7,000
Educational loans and scholarships	1,392	1,525	1,500
Supplies:			
Operating supplies	2,010	1,724	2,000
Maintenance	411	856	750
Stationery, printing, and office supplies	32,515	33,209	33,500
Postage	1,651	2,056	2,100
Material O/H on supplies	1,732	1,634	1,980
Maintenance	938	983	1,000
Other	15,829	16,982	17,500
Public Utilities:			
Telephone	59,105	61,372	65,000
Heat, light, and power	237,512	241,298	245,000
Miscellaneous Income & Expense:			
Legal and auditing	16,714	10,945	15,000
Professional services	21,197	23,791	22,500
Patent expense	18,466	9,084	10,000
Public relations	12,155	14,172	15,000
Cash discounts	(71,258)	(72,581)	(75,500)
Transfers between divisions	(48,243)	0	0
Corporate expense	1,556,956	1,673,824	1,750,000
Fixed Charges:			
Insurance – property	9,820	10,930	11,000
Insurance – inventories	4,024	4,543	4,500
Franchise tax	239,390	246,624	250,000
Rent – equipment	1,426	1,426	1,426
Other:			
Independent research	1,372,940	1,276,842	1,300,000
Bid and proposal	743,902	526,209	700,000
Total G&A expenses (A)	**$ 6,148,431**	**$ 6,089,195**	**$6,385,881**
Total costs of manufacturing (B)	**$70,993,247**	**$72,932,479**	**$73,549,800**
G&A rate (A) ÷ (B)	8.7%	8.4%	8.7%

*Includes budgetary estimate for last two months.

[This example constitutes minimum acceptable identification. However, to do a good pricing job, you probably would require a breakout of the December 31, 19X4 data into two columns, one for the 10-month actual, the other for the two-month estimate. With regard to independent research and bid and proposal expenses, if there are advance agreements, the explanation should so reference. Latest actual and estimated program expenditures and allocation bases should be provided.]

Example 8 – General and Administrative Expense

Table 6-8 is taken from the cost estimate supporting the offer. The column headings are those specified in FAR Table 15-2.

TABLE 6-8

COST ELEMENTS (1)	PROPOSED CONTRACT ESTIMATE – TOTAL COST (2)	PROPOSED CONTRACT ESTIMATE – UNIT COST (3)	REFERENCE (4)
General and administrative expenses	$28,500	$95	Note 12

The offeror's submission, as shown in the reference column in Table 6-8, includes a note supporting the $28,500 estimated for G&A. This is reproduced here as Note 12.

Note 12:

This amount was computed by applying a 8.7% rate to the total manufacturing costs estimated to be incurred on the proposed contract in 19X5.

The above rate was agreed to on December 20, 19X4 by the administrative contracting officer assigned to our manufacturing division. This agreement stipulates that the agreed-upon overhead rate will be used by the ACO in locally negotiated procurements of less than $1 million during the first six-month period of calendar year 19X5. The agreement is subject to cancellation by either party with 30 days written notification. Details supporting the rates were submitted to the ACO and also are available from our comptroller.

6.4 Certified Cost or Pricing Data

The currency of cost or pricing data is judged somewhat differently for indirect costs than for direct costs. The why and how of this is discussed and then demonstrated by an example.

First, overhead is a period cost. The overhead costs are not complete until the books are closed for that period and all adjustments made. This means that the monthly overhead costs and rates for a company operating on an accrual basis are approximations of the real costs. Any one month's overhead dollars and rate may not be a reliable basis for projection unless they continue a trend developing over several months.

Second, overhead is expressed as a rate. Generally, the rate expresses the percentage relationship between the overhead costs and the base cost. Because one overhead pool will include many different types of costs with different patterns of expenditures, rates may vary significantly from one month to the next without invalidating the projection of overhead costs for the total period. Some of the expenses in overhead pools are recognized on the basis of cash outlays during the year, with year-end corrections on the basis of estimates. Examples are measurement of supplies, inventories, and meter readings to estimate accrued utility expenses. Month-to-month expenses are not expected to be precisely correct; rates based on adjusted yearly totals are used to distribute costs. Monthly variations in the accumulation of costs don't have an impact on the application of costs to contracts.

Third, overhead costs are accumulated in the pool, and periodic (usually monthly) summaries are drawn. These summaries usually are not available until well into the next period; the lag may be two or more work weeks. Year-end closings and adjustments usually require an even greater time before the annual overhead rate can be obtained; this delay may be as much as three months. These delays are the reason the FAR requires that closing or cutoff dates be included as part of the data submitted with the proposal and updated before an agreement is reached on price.

To illustrate the foregoing, assume it is 25 April 19X4 and you are looking at a proposal for 350 generator sets. Five generators will be delivered in November 19X4, 20 in December, and, starting in January 19X5, 25 per month. Assume there is a single source and that the company's fiscal year is 1 January – 31 December. What do you require from this company in the way of overhead cost or pricing data? What do you have to have?

You need recorded overhead expenses broken down into component cost elements, together with the base costs. You use these historical data in evaluating the nature of the expenses and the reasonableness of the amounts. You also use these costs to plot trend lines, and you will have to get a forecast of the overhead expense, by element, and a forecast of the base against which the overhead expense pool is allocated. If the dollars of your procurement warrant, you will get these data from the company; otherwise, you may want to rely on the ACO's bid rate negotiations. If so, the ACO will send you a written memorandum of negotiations and a copy of any agreements entered into with the company.

Assuming the company's monthly costs are available as of the 15th of the following month, you will have, on 25 April 19X4 when you start to analyze the generator proposal, actuals for 19X2 and 19X3 and the first three months of 19X4; the cutoff date is 15 April. You will have a projection of overhead and base for the period (or approximate period) of contract performance, 1 June 19X4 through 31 January 19X6.

Negotiations are started on 11 May 19X4, and the offeror updates the proposal. A purchase order estimated at $75,000 in the proposal has been placed at $60,000; this causes a reduction of more than $15,000 in the proposed price. (The reduction in base costs against which the rates are applied results in lower estimates for G&A expenses and profit.) Factory overhead, including an average monthly expenditure of $50,000 for plant rearrangement, has been projected at 325 percent. The rearrangement account has been running close to the $50,000 average for 16 months (through 31 March 19X4). During negotiations, the company submits the factory overhead for April 19X4. It supports the continued reasonableness of the 325 percent rate but, at the same time, shows that in April the plant rearrangement account was charged with only $35,000.

However, unlike the $15,000 difference between estimated and actual purchase order prices, this $15,000 difference from average may have little or no effect on either contract price or overhead rate. There are several reasons why this may be so: this fluctuation is normal and can be expected from one month to the next; the decrease in rearrangement expense was more than offset by an increase in maintenance cost; and the difference of $15,000 in an expense pool totaling $9,000,000 had no appreciable impact on the rate, considering the fluctuations of the other costs carried in the factory overhead account.

6.5 Importance of Indirect Cost Pools

Obviously, part of the importance of indirect costs is the amount of dollars included in this category. In most instances, total indirect costs will far exceed the total cost of direct labor. Even where the operation provides a service with relatively low overhead, selling the knowledge and skills of people but involving little or no manufacture (machining and assembly) of a product, the overhead dollars are a significant part of the total cost.

Importance also can be measured by the fact that the ability to control overhead costs is a mark of good management. Overhead costs are an emotional subject, and the emotion expressed is often a sneer brought on by years of hearing "plain pipe racks," "out of the high-rent district," "cut out the middleman," and similar phrases. Sneer or not, proper overhead costs are necessary to the efficient conduct of business. The efforts accounted for as overhead need constant policing to make sure that they remain necessary.

One other characteristic should be noted. Part of the prejudice against overhead is obvious in the common expression "That rate is too high." This conclusion is often inane and can be outright dangerous. Because a rate represents the relationship between one number and another, it is relevant only to what's in those numbers. An overhead of 90 percent can be too high and one of 400 percent too low, depending on what's in the base and what's in the overhead. The 90 percent can describe a manufacturing company that still relies on hand labor and hand tools with no automatic machines. As a result, its direct labor base, against which its overhead is measured, is high because of the greater amount of time needed to perform the tasks. At the same time, overhead is less than might otherwise be the case because it includes little or no costs for depreciation of machinery. This is obviously a simplification, but it is reasonable as far as it goes and it illustrates the point.

The danger here is not that the rate is too low, but that the unit cost of a product from an unmechanized plant or a plant that is old and filled with worn-out, fully depreciated machinery can be much higher than the unit cost from a modern plant with an overhead rate much, much higher.

To summarize, any given overhead rate can be too high or too low, depending on what costs are classified as direct, what costs are included in overhead, and the actual situation depicted by the nature of the costs in both categories. The rate is simply the device by which the costs are allocated.

6.6 Indirect Cost Behavior

The various elements of overhead don't all behave the same way as business activity changes. It helps to classify indirect expenses by their expected behavior with changes in volume. There are three broad categories: fixed expenses, variable expenses, and semivariable expenses, but don't try to be too precise in categorizing elements. Every expense is subject to management's control, and if the time period is long enough or the business need is intense enough, all expenses are variable. Even so, you will find it useful to understand the concepts underscoring the belief that the overhead rate should go down as the level of business activity goes up.

The labels can be confusing. Fixed expenses include those items that are relatively constant and do not vary with changes in production volume in the short run, within reasonable limits of plant capacity. Examples of fixed costs are items, sometimes called period costs, primarily related to time. Some of these are rent, depreciation, property insurance, and property taxes. Remember, however, that all costs are controllable to some degree. The overhead rate does not need to go up solely on the basis of volume going down.

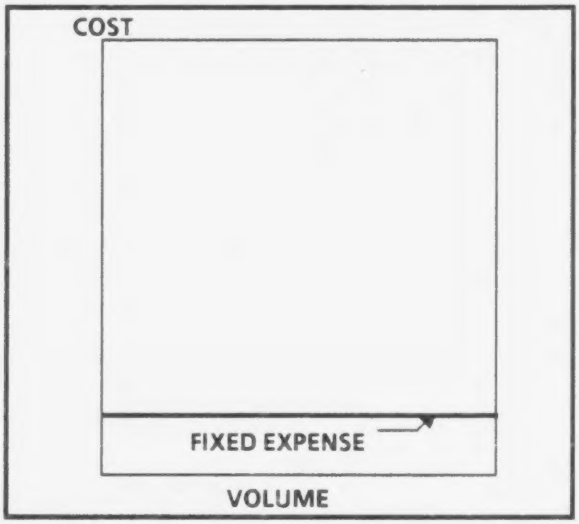
Variable expenses fluctuate directly and proportionally with production volume. Examples include indirect labor of many kinds, supplies, and power, and many payroll-related costs such as workman's compensation, payroll taxes, and fringe benefits. Unit costs confuse the distinction between fixed and variable expenses. Cost elements that are fixed in total contribute a variable amount to unit cost, depending on the number of units produced, while variable expenses contribute a fixed cost per unit, regardless of production volume.

Few indirect expense accounts are purely fixed or purely variable. Even so, it often is useful to categorize accounts according to their main tendencies.

Semivariable expenses vary directly but less than proportionally with business activity. These expenses may remain relatively fixed between various ranges of volumes and then advance or decline as volume shifts. Supervision labor often is considered a typical semivariable cost.

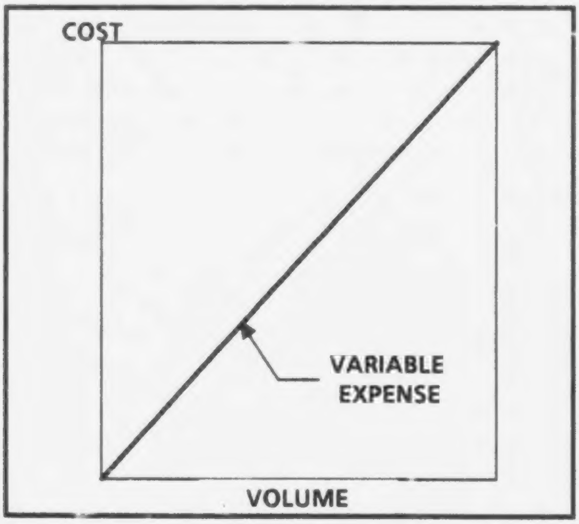
The following graphic presentations give a general picture of the behavior of these costs. Fixed costs are charted (Figure 6-1) as a horizontal line, having the same total for the period, regardless of the volume or other measure of business activity. The fixed total must be assigned over the total number of units so that if the volume is cut in half, the per-unit cost for fixed expenses will be doubled. The greater the proportion of fixed expenses in total overhead, the greater will be the fluctuation in per-unit overhead charges because of changes in production volumes.

FIGURE 6-1



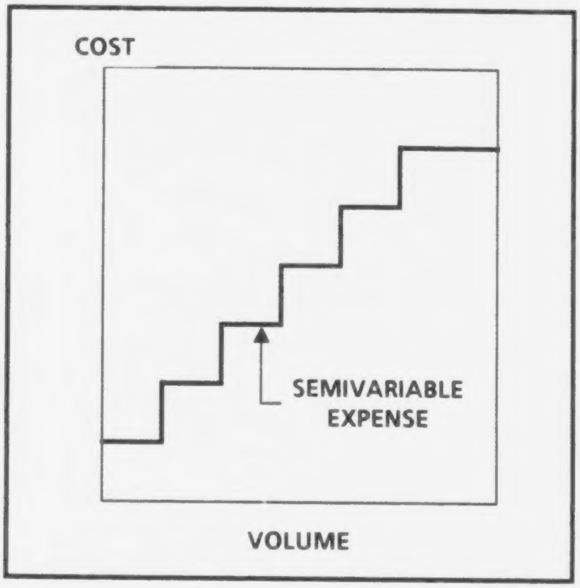
Variable expenses are shown in Figure 6-2 as a constantly increasing line through the origin. This implies that the per-unit overhead costs based on such costs will remain constant no matter what the volume.

FIGURE 6-2



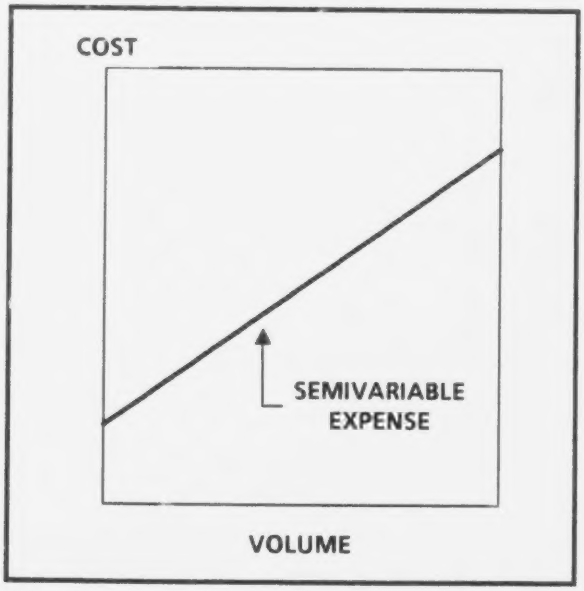
Semivariable expenses are thought to be step-like, as in Figure 6-3. An expense of this nature might be the cost of renting a machine that, once available, can provide savings in per-unit costs by handling a greater volume. Once its capacity is reached, however, greater volume can be achieved only by renting an additional machine.

FIGURE 6-3



Individual elements of indirect expense may indeed have such a step-like behavior, but it usually is more practical to use a straight line such as that of Figure 6-4, which smooths the steps but represents the same general trend.

FIGURE 6-4



The true behavioral pattern of overhead costs is not necessarily as predictable as these figures would indicate. Some expenses may even decrease with increases in volume. Low volume may prompt a company to increase investment in research and development or in labor-saving capital equipment to gain a better competitive position. A volume consisting of extensive production of a single item may generate less overhead than the same volume representing a diverse operation devoted to many projects, including development items.

The total of an indirect expense pool such as engineering overhead can be considered to have both fixed and variable components, as depicted in Figures 6-1 and 6-2. If these two components are combined, the result is a figure like Figure 6-4. As a practical matter, therefore, it often will be enough to find a relationship such as that on Figure 6-3, for the total of each significant indirect expense pool. The following segments describe four methods that can be used to develop graphs to represent the predicted cost-quantity relationship.

The J. H. Williams method

This method determines a minimum and maximum volume, estimates the total cost for the item at these two points, subtracts the minimum volume from the maximum volume and the minimum cost from the maximum cost, divides the difference in cost by the difference in volume, multiplies the minimum and maximum volumes by the unit variable cost, and subtracts the total variable costs from their respective total costs to derive the fixed-cost portion of the expense item. Table 6-9 illustrates the method.

TABLE 6-9. THE J. H. WILLIAMS METHOD

	VOLUME (IN HOURS)	ITEM BUDGET ALLOWANCE	VARIABLE COST	FIXED COST
Maximum	500,000	$20,000	$15,000	$5,000
Minimum	300,000	14,000	9,000	5,000
Difference	200,000	$ 6,000	$ 6,000	$ 0

In this illustration, the variable cost of the expense item is $.03 per hour ($6,000 divided by 200,000 hours) and the fixed-cost element for the overhead item is $5,000.

The standby cost method

In this method, you simply estimate the fixed costs that would continue in the event of a temporary shutdown, and the remainder arbitrarily is considered variable.

Graphic correlation

Graphic correlation uses a scatter diagram of experienced costs and constructs the cost curve by inspection. The intersection of the cost curve and the vertical axis identifies the fixed portion of the expense item.

Least squares

Least squares is a more scientific application of the graphic correlation approach, involving use of a least-squares calculation to develop the formula for the appropriate cost curve.

The analysis of an expense item's cost variability can produce a negative value for fixed cost under the Williams, graphic, or least-squares methods. Although this situation ordinarily would not occur, it could result from the expense being out of control, incorrect accounting, nonrepresentative data, development of an incorrect factor of variability, discretionary cost decisions, a nonlinear cost pattern, or miscellaneous external influences.

6.7 Budgeting and Controlling Indirect Costs

Indirect costs are, by definition, related to more than the proposed contract. Determining a fair and reasonable contract price requires you to consider the offeror's plant-wide management of indirect costs. It is especially important to consider the budget and control situation if the offeror has, or is likely to have, Government contracts other than the one you are considering. If this were a one-time relationship, you might be able to limit analysis to the estimates in the proposal. If there is to be a continuing relationship, you should encourage the contractor to take steps toward effective management of indirect costs.

The desire for profit motivates companies to control costs, including overhead. This motivation is much weaker when the company's selling prices are based to a significant extent on actual or expected costs, without concern for the prices of competing products. Thus, when you negotiate prices on the basis of cost, much of the cost risk is borne by the Government and the contractor has only limited incentive to control indirect costs.

To manage its indirect costs, a company must first determine what the costs should be and then hold actual costs to the plan or justify all significant variances. Most, if not all, major companies exercise management responsibility through budget planning and control systems.

We have an interest in the reasonableness of planned costs because those costs become the basis for overhead rates used in forward pricing. We have a similar interest in the resulting actual costs because we pay or share in those costs in final settlements of cost-reimbursement and incentive-type arrangements. Also, actual costs tend to become the patterns or "bogies" for future years.

Budget planning and control systems can be expected to vary among contractors and, to some extent, among profit centers (divisions or plants) within a company. The general requirements of such systems are stated broadly, so that they apply to all major companies regardless of their differences in missions, organizations, and accounting methods.

The first things to know about a contractor's budget system are who initiates the figures, who reviews them, and who finally approves them. The company should have a formal arrangement for budget preparation.

Before considering costs, someone in the company must issue assumptions and guidance. Generally, the sales volume assumption is the responsibility of the marketing executive. Special guidance is provided by the general manager and often, in the case of multiplant companies, by the corporate office. A top official in the financial department of the company usually coordinates the various budget efforts. Upon receipt of the assumptions and guidance, the official issues that information to the department heads and staff directors and calls for budgets.

Costs should be budgeted initially by the lowest organizational level responsible for their control. As the budget is adjusted in higher-level reviews, the preparer should participate in the adjustment process. In any event, the preparer should understand how the final budget was arrived at and should be convinced that it is attainable.

Budget review takes place at each supervisory level, up to final approval by the plant's chief executive. The review procedure must be able to deal with inconsistencies among budgeting units and with conflicts of interest in the total process. The financial department usually reviews the budgets independently. In fact, the indirect cost budget should be a joint effort of the financial and operating organizations. Also, the use of budget review committees can be effective, if those committees are made up of department chiefs and senior administrative officials.

Surveillance of operations under the budget reverses the pattern of budget preparation. There should be a chain of responsibility from the department head to the individual responsible for each cost. The quality of a budget planning and control system depends on people and how they are organized and supervised. The company should demonstrate that its budgeting process has the checks and balances to promote objectivity and realism in the budget plan.

A sound budget plan involves forecasting the costs required to perform functions at a given level of company activity. No attempt should be made to predict costs until a reasonable estimate of volume has been made.

Volume projections

In computing overhead rates, the indirect costs are the numerator and the base is the denominator. The various bases (e.g., direct labor or production cost) are derived from sales volume. Any significant error in the volume (the base) will result in a corresponding error in the rate, no matter how closely the costs have been predicted.

Volume means sales dollars, cost of sales, production units, or some other appropriate measure of business activity. This volume may be derived from Government contracts, subcontracts, and commercial work. The projection of sales volume usually is presided over by the marketing department after it has received specific guidance from top management. Companies usually prepare two volume projections, one for a single year and one for a longer period such as three or five years.

One method used in the one-year projection is to stratify the estimate into firm, near-firm, anticipated, and potential business.

Firm business consists of contracts or purchase orders that are committed to planned production without any further contact with the customer. Frequently, firm business is stated as "backlog." Near-firm volume is volume that, under normal conditions, can be expected to come to the company. An example is follow-on spare parts business.

Anticipated volume is volume that is expected to result from various bids and proposals. History is a guide in this computation. Many companies use statistics to determine the percentage of "wins" likely to result from a given number of bids and proposals submitted. Potential business is largely an unknown. Many major programs fall within this category. In the case of large programs, the company has no way of knowing whether it will win all or any part of a procurement until the source selection has been made and award is announced; yet, that potential volume could affect sales within the first budget year.

Because some procurements require overhead rate forecasts for longer than one year, the company must translate experience into the best probabilities available. Here the problem is to weigh all evidence to determine why and to what extent subsequent years will deviate from the first year's projection. While the planning system cannot be expected to be accurate in such situations, the estimate it furnishes should be supported by reasonable logic and documentation.

A company may use engineering estimates to translate sales volume into labor bases for computing overhead rates. On major projects, the estimates may be based upon work performance analysis, which is an industrial engineering approach. On a multitude of smaller procurements, the computation of the base may be statistical. A contractor's budget and control system must include a method of forecasting sales and show that a reasonable base has been derived from the projected sales volume.

Functional organization

Indirect costs are incurred for the performance of specific functions. The reasonableness of indirect costs depends not only on the amounts of those costs, but also on the necessity for or value of what they pay for. Hence, a budget planning and control system should begin with a justification of the company's functional organization.

Certain major functional divisions can be found in all manufacturing companies. These include administration, engineering, manufacturing, and support services. In many companies, materials purchasing and handling is a separate function. The support services function is broken out into the specific service provided, as, for example, data processing, printing, or graphics.

Each of the major functional divisions can be broken down into major subdivisions and further into smaller elements. For example, finance might be a subdivision of the administrative division. Under finance one would expect to find accounting, auditing, and budgeting. The accounting subfunction could be divided into general ledger, accounts receivable, cash disbursements, etc. If the accounts receivable department consisted of three heterogeneous units, each might represent a separate function for budgeting purposes.

A company's budget and control system should provide for continuous review of its functional organization, because evaluation of the necessity for a function should come before evaluation of the cost to perform that function. This review should evaluate functions established during periods when volume or production methods differed significantly from those currently in effect.

The functional organizations of a company should be analyzed to determine whether lower total costs or better efficiency could be obtained by organizational changes that would increase the number of indirect functional breakouts. The planning of indirect costs always must be accomplished within the framework of total cost planning. Analysis of indirect functions requires a detailed understanding of how the company is organized down to the lowest level. Also, justification of indirect functions implies an understanding of the direct functions as well as those charged indirectly.

Manpower costs

Indirect costs may be divided into two broad categories: manpower and related expenses; and other costs. Manpower and related expenses are the largest segment of overhead cost, representing from 60 to 65 percent of the total.

The best way to arrive at projections of indirect manpower is to analyze the tasks to be performed. This is done by using engineering estimating techniques similar to those used for calculating direct manpower requirements. Other indirect expenses, those that tend to vary directly with direct labor, can be subjected to engineering analyses. An example is manufacturing supplies.

The company should segregate indirect costs into fixed and variable categories, including identification of the fixed and variable portions of semivariable costs, in order to develop cost-volume relationships. These are useful in evaluating estimates and essential in interpreting variations when tracking and controlling.

A common method of evaluating indirect cost projections -- both manpower and expenses -- is to compare the projections with previously incurred costs, either in direct dollar amounts or as percentages of the base. It is reasonable to question costs if they are higher than those incurred previously, after allowance is made for inflation and other such factors. It is not reasonable, however, to assume that the historical costs are necessarily as low as they might have been. Hence, comparative costing is useful in establishing "ceilings."

Responsibility for control

The control of an indirect cost is the responsibility of the unit manager for whom the cost is budgeted. Successful control depends to a large extent on the part the unit manager played in setting the budget goal. Allocated costs like depreciation, taxes, insurance, and employee benefits cannot be controlled by department heads; they should not be held responsible for the amounts for those items budgeted to their departments. Therefore, assignment of cost responsibility will not agree entirely with cost allocations.

Service department costs receive special treatment depending on whether the costs are allocated to the departments or charged on a job basis. The costs of service departments (e.g., the cost of data processing) are the responsibility of the service department head. Service costs that can be controlled by the operating departments (e.g., volume of data processing used) should be the responsibility of operating department managers.

6.8 Factory Overhead

Factory overhead, also called manufacturing expense or factory burden, embodies all items of production cost except direct materials, direct labor, and other direct costs. The component elements of factory overhead consist of several major categories of expense, including:

a. Indirect labor, consisting of supervision, inspection, maintenance, custodial, and other personnel who are not charged directly to a product or operation.

b. Costs associated with labor, such as social security and unemployment taxes, vacation pay, shift and overtime premiums, and group insurance.

c. Indirect supplies, such as small tools, grinding wheels, janitorial supplies, and lubricating oils.

d. Fixed charges, including depreciation, insurance, rent, and property taxes.

Estimating the trend of factory overhead dollars requires a knowledge of fixed and variable components and an understanding of volume effects on cost behavior. One way to analyze is to segregate, either in detail or approximately, the fixed from the variable costs. This accomplished, total estimated volume is determined.

This volume, on which the total overhead amount is based, should represent all the business of a firm, plant, or department, and not merely the total volume of Government business. If the work the contractor does for the Government occupies a special plant or facilities otherwise physically segregated, then at least the factory overhead on such work will be separated from other factory overhead, and forecasting may be simpler.

Production volume is based on the firm's sales projection and should consider:

a. The general economic outlook for the nation, industry, and the firm.

b. Political and governmental influence such as potential market effects of the national and international political situation.

c. The competitive nature of the industry.

d. Promotional efforts planned and the related attributes of potential customers.

e. Internal company factors such as past sales, pricing policy, capacity, and manufacturing and distribution costs.

Company sales projections may be based on the trends of product sales, sales estimates developed by the sales organization, the application of the "share of the market" concept to industry forecasts, and the correlation of sales with a more general statistical measure such as disposable personal income. Suggestions for evaluating sales or production volume forecasts are made later in this chapter.

The production budget generally depends on the sales forecast and must consider such factors as the annual production by product, inventory policies, availability of labor and materials, leadtime, length of the production period, economic lot sizes or order quantities, and the capacity of manufacturing facilities.

Many companies use a flexible overhead budget to estimate costs at different levels of volume. This budget consists of a schedule of estimated overhead at various volumes of production expressed as number of units produced, direct labor hours, direct labor costs, tons of output, or other units of measure. If the company does not use a flexible budget, you may get enough information about fixed and variable costs to construct a rough approximation for total overhead.

Specific analytical requirements include:

a. A comprehensive review by cost account to establish historical trends by type of expense. To make a realistic projection of future probabilities, get historical trends for a significant time period. Remember that overhead costs can fluctuate widely from month to month.

b. Projection of costs by account, or by a group of accounts, which develops probable costs for the future period in which the contract will be performed.

c. Determination of the overall reasonableness of overhead cost as estimated.

When a company in a highly competitive commercial field has a relatively small portion of Government business, a comprehensive review by expense account to establish historical trends may not be of great value, particularly if volume remains relatively constant. However, the review should identify and exclude items that do not apply to Government business.

In an organization that primarily handles Government contracts, however, the review covers not only consideration of items that are inappropriate costs in Government contracts, but also the soundness of the company's projections. Companies will have developed data for their own use in controlling costs and should not deny the use of these data in review.

Any review of overhead costs should be directed toward what the overhead cost, by major classification, should be as well as what it is likely to be. The fact that significant fluctuations in volume may occur from year to year makes this particularly true.

Normally, overhead rates are expected to decrease as volume increases and to increase as volume decreases. Experience shows that companies usually do not expand plant, organization, and equipment to meet increases in volume as rapidly as they plan and project. Experience also shows an even more serious lag in reducing overhead costs in the face of volume decreases. Comparisons of overhead costs and rates with those of other contractors in a similar line of business may give you information to use in negotiation. Differences in accounting systems and classifications of costs, however, can limit the usefulness of comparisons.

Assignment to contract

After determining the total amount of indirect costs to be expected in a period on the basis of projected volume (or other measure of business activity), you should determine the share of these estimated costs to be assigned to a specific contract.

Two separate issues are involved. The easy one is the straightforward application of the offeror's cost accounting system. If, for example, a factory overhead rate has been established at 210 percent of factory direct labor, you can find the factory overhead for a particular proposed contract as soon as you know the direct factory labor proposed for the contract. The more challenging issue is that of evaluating the fairness of the cost accounting system.

The contractor's system should have been designed to comply with the broad principles of FAR 31.203(b):

> Indirect costs shall be accumulated by logical cost groupings with due consideration of the reasons for incurring such costs. Each grouping should be determined so as to permit distribution of the grouping on the basis of the benefits accruing to the several cost objectives. Commonly, manufacturing overhead, selling expenses, and general and administrative (G&A) expenses are separately grouped. Similarly, the particular case may require subdivision of these groupings, e.g., building occupancy costs might be separable from those of personnel administration within the manufacturing overhead group. This necessitates selecting a distribution base common to all cost objectives to which the grouping is to be allocated. The base should be selected so as to permit allocation of the grouping on the basis of the benefits accruing to the several cost objectives. When substantially the same results can be achieved through less precise methods, the number and composition of cost groupings should be governed by practical considerations and should not unduly complicate the allocation.

Decisions about the appropriateness of an allocation system, once made, should not be changed frivolously; consistency is important in developing the data used to make projections. You should, however, check the possibility that there may be systematic distortion if the wrong allocation base is used or if indirect costs are inappropriately grouped.

The offeror should be aware of the characteristics of different products or services, as well as the relationships between sales prices and measured costs. It is likely that, in designing a cost accounting system, the offeror will have attempted to assign at least a fair share of costs to those products or services that are most often priced on the basis of cost.

To illustrate, assume that a company has a small "special production" staff working primarily on Government contracts priced largely on the basis of cost, while the rest of the manufacturing staff works on projects, both commercial and Government, producing items sold in a competitive market. The special production staff has a higher average wage rate than the rest of the manufacturing direct labor and works in an isolated area of the plant where certain factory overhead functions are performed only slightly or not at all.

The company can be expected to design a cost system under which the high special production wages will draw a healthy share of the full factory overhead. It will be up to the Government to evaluate alternatives. One would be to use separate indirect cost pools for regular factory overhead and for special production overhead. Another would be to use direct labor hours instead of dollars as the allocation base. Such changes can be important. They should be proposed only if a consistently fair allocation can be expected.

Labor base

Developing a sound labor base to use in establishing overhead rates for estimating purposes is difficult. Often a contractor is reluctant to consider hours that will be required by future business as yet unbooked. Almost all commercial organizations in highly competitive fields must and do take into account unbooked orders as a part of normal business risk. You should insist that the contractor consider the impact of the contract in question, any potential increases in commercial business, and a normal expectation of new and overlapping Government contracts, to establish a realistic basis for overhead projection.

If overhead rates express a ratio of total overhead costs to direct labor costs, an increase in the direct labor base without a corresponding increase in overhead costs should reduce this ratio. A general wage increase would increase the base significantly, while the overhead pool would be affected only in those items of indirect labor or labor-related costs. If increases in labor costs are anticipated, you should ensure that this factor has been taken into account in projecting overhead rates.

The overhead rate may or may not be a sound measure of relative efficiency. A high rate does not necessarily indicate inefficiency. It may result from a high degree of mechanization in the plant, department, or cost center, or the accounting classifications of particular costs as direct or indirect.

6.9 Engineering Overhead

Engineering overhead includes the cost of directing and supporting the activities of the engineering department. Not all companies departmentalize engineering; some use a single, plantwide rate. When there is separate identification, the efforts charged to the engineering overhead pool are not unlike efforts charged against factory overhead. There is indirect labor, both supervisory and support. There are the costs associated with labor. There are indirect supplies and fixed charges. Engineering overhead is estimated and analyzed in the same way as factory overhead.

6.10 General and Administrative (G&A) Expenses

G&A includes the expenses of a company's general and executive offices, the cost of such staff services as legal, accounting, public relations, financial, and similar functions, and other miscellaneous activities related to the overall business. Selling expenses may be included, or they may be accounted for separately.

This type of indirect expense neither lends itself to nor requires the degree of departmentalization that can be applied to factory or engineering overhead. G&A expense does, however, include several component elements requiring analysis and special consideration.

For example, the reasonableness of total executive compensation may be a critical area. Compensation for personal services includes all remuneration paid currently or accrued, in whatever form and whether paid immediately or deferred, for services rendered by employees during the period of contract performance. Included are salaries, wages, directors' and executive committee members' fees, bonuses (including stock bonuses), incentive awards, employee stock options, employee insurance, fringe benefits, and contribution to pension, annuity, and management incentive compensation plans.

These costs may be allowable if total compensation of individual employees is reasonable for the services rendered and does not exceed the costs allowable by the Internal Revenue Code and regulations. Compensation is considered reasonable if the total amount paid or accrued is commensurate with compensation paid by other firms of the same size, in the same industry, or in the same geographical area for similar services. Special consideration and possible limitation may be required for:

a. Compensation to owners of closely held corporations, partners, sole proprietors, or members of immediate families;

b. A change in a contractor's compensation policy that causes substantial increase in levels of compensation; or

c. Businesses in which compensation levels are not subject to the normal restraints of competitive business.

Because G&A expense is for the business as a whole, the G&A expense pool must be allocated on the basis of a measure of the overall business activity. In principle, the allocation usually should be a measure of cost input or a measure of value added. Under some circumstances, other allocation bases such as direct labor dollars or cost of goods sold may be used. Changes in the established cost accounting system should not be sought on the basis of the impact on a single contract.

The procedures and techniques for analyzing G&A expense are similar to those used for factory overhead.

6.11 Independent Research and Development and Bid and Proposal Costs

Costs of Government contracts can include independent research and development (IR&D) and bid and proposal (B&P) costs. The rules relating to these costs are set forth at FAR 31.205-18. In general, the contractor is expected to finance some of the costs for these activities from profit and to recover some of the costs in selling prices of current work.

A ceiling, a maximum to be allocated as a recoverable cost, is established for each company. These ceilings are negotiated in advance for large contractors, and are developed by formula based on the historical relationship between sales and such costs for other contractors. The total allowable IR&D/B&P cost is to be allocated to contracts and other work of the company on the same basis as that used for the G&A expense pool.

Analysis of proposed IR&D/B&P costs should assure that the ceiling has been correctly determined, determine the likelihood that IR&D/B&P costs at least as great as the ceiling amount will in fact be incurred, determine an IR&D/B&P allocation rate, which is the ceiling amount divided by the total G&A allocation base, and determine the amount allocable, by applying the rate to the G&A base for the proposed contract.

In connection with the review of IR&D/B&P costs, you may want to review relationships between the profit center that will perform the proposed contract and other segments of the corporation; the IR&D/B&P costs may have been incurred in other segments. You must be satisfied that the technique used provides fair and equitable cost allocations to the work being proposed.

6.12 Selling Expense

Selling costs arise in marketing and distributing the contractor's products and include the expenses of negotiation, liaison between Government representatives and contractor personnel, and other related activities.

To the extent allowable, selling expenses may be allocated directly to specific sales, identified with certain product lines or types of customers, or allocated to output on an arbitrary basis. Common bases for distribution or estimation of selling expenses are total cost of sales and total selling price. The procedures and techniques for analyzing selling expense are similar to those used for factory overhead. There are, however, special considerations relating to foreign military sales; they are discussed in Chapter 9.

6.13 Volume Projections

For each type of indirect expense, estimate not only the amount of expense to be accumulated but also the amount of the allocation base. Estimating future business activity often is a difficult aspect in price negotiation; two forces combine to make the offeror propose relatively low activity.

One of these is a natural conservatism; a business manager must always balance the optimistic outlook of a sales-oriented staff with the "hard-headed" financial attitude that hesitates to rely on uncertain prospects. The other force is the fact that pessimistic volume estimates lead to higher overhead rates for the present negotiation, and therefore to higher prices now.

The nature of the business is important. If the volume to be estimated consists only of a few large contracts with the Government, there is little point in trying to use statistical techniques. Instead you will have to rely on the best available expressions of the Government's plans. Where the total business activity includes a larger number of relatively small orders, whether Government or commercial, or both, you may be able to use a suitable statistical technique.

One method establishes a relationship between current sales backlog and the future sales total. The method is demonstrated by the data in Table 6-10.

TABLE 6-10. VOLUME PROJECTION BASED ON ACTUAL SALES

BACKLOG	12 MONTHS	$	PERCENTAGE
19X2			
Jan - $69	Jan - Dec X2	$87	126%
Apr - 68	Apr X2 - Mar X3	88	129
Jul - 66	Jul X2 - Jun X3	86	130
Oct - 64	Oct X2 - Sep X3	82	128
19X3			
Jan - $59	Jan - Dec X3	$78	132%
Apr - 56	Apr X3 - Mar X4	71	127
Jul - 52	Jul X3 - Jun X4	67	129
Oct - 52	Oct X3 - Sep X4	66	127
19X4			
Jan - $55	Jan - Dec X4	$70	128%
Apr - 58	Apr X4 - Mar X5	75	130
Jul - 60	Jul X4 - Jun X5	79	132
Oct - 57	Oct X4 - Sep X5	74	129
19X5			
Jan - $56			
Apr - 58			
Jul - 60			
Oct - 62			

You may need to use a method like least squares to fit a trend line from these data, but a straight reading shows a definite relationship that makes the data useful. We have combined the actual data in 12-month segments, which might be suitable for forecasting bid rates. However, if the performance period is of a different length, the data should be recombined into a more appropriate totals.

6.14 Indirect Cost Projections

In evaluating indirect cost projections relating to a particular Government contract, the following procedures are suggested if the dollar value of the proposed procurement warrants and if the total overhead pool can be ascertained for a company, division, department, or cost center:

a. Determine that the period considered in estimating overhead costs is consistent with the contract action contemplated.

b. Determine the projected production and sales volumes for that period.

c. Review projections of manpower by such broad functional areas as assembly, machining, tooling, plant supervision, accounting, engineering, sales, and office.

d. Check the component elements of overhead for reasonableness, necessity, and applicability to Government contracts.

e. Establish an estimate of total amount of applicable overhead costs.

f. Determine a reasonable estimate of the overhead dollars to apply to a specific contract.

The base period for allocation of indirect costs is the period during which the costs are incurred and accumulated for distribution to work performed during that period. Normally, the contractor's fiscal year will suffice, but use of a shorter period may be appropriate for short-run contracts or where the use of a shorter period is common practice in the industry.

When a contract is to be performed over an extended time, you should use as many fiscal years, or other base period, as are needed to represent the period of performance. In any case, the base period or periods should be selected so as to avoid inequities in the allocation of costs.

The principal rules governing the applicability of costs for pricing purposes are those of reasonableness and necessity, allocability, and allowability. A cost is reasonable and necessary if, in its nature or amount, it does not exceed what would be incurred by an ordinarily prudent person in the conduct of competitive business (i.e., the prudent man concept).

A cost is allocable to a Government contract if it (1) is incurred specifically for the contract, benefits both the contract and other work, and can be distributed in reasonable proportion to the benefits received or (2) is necessary to the overall operation of the business, even though a direct relationship to any particular cost objective cannot be shown.

Factors to consider in determining the allowability of individual items of cost include:

a. Reasonableness.

b. Allocability.

c. Cost accounting standards, if applicable; otherwise, generally accepted accounting principles and practices appropriate to the particular circumstances.

d. Any limitations or exclusions on types or amounts of cost set forth in acquisition regulations or otherwise included in the contract.

When a contractor has disclosed cost accounting practices in accordance with CASB rules, regulations, and standards, and a practice is inconsistent with a provision of the acquisition regulation, costs exceeding the amount that would have resulted from the use of a practice consistent with the acquisition regulation will not be allowed. It must be noted that cost accounting standards are determinative as to the costs allocable to contracts. While allocability is not a negotiable consideration when covered contracts are priced or costed, the acceptability of the whole or any part of the amount allocated is subject to negotiation.

Determining what types of costs are acceptable on Government contracts is a necessary function of analysis. The controversial elements are those involving a determination of which expenses the Government should recognize in pricing.

When the Government has a significant continuing interest, as it does in major systems, advanced techniques and methods of analysis may be used. A company's own cost history can be used to develop a bank of knowledge, and continuous updating permits an evaluation and demonstration of how well costs are controlled by the company.

At some locations, parametric techniques are used to track and predict future costs. Historical costs, grouped according to behavioral characteristics, are adjusted to a constant dollar basis for comparison, and factors are developed to explain the behavior of the cost groupings. These advanced techniques may be subject to certain limitations, but, where used properly, they will help you understand and project indirect costs.

6.15 Teamwork

In analyzing overhead, remember that indirect costs are allocated to all the business of the contractor, commercial as well as Government. Little can be done in the short run about a company's existing cost accounting system or about the costs allocated to your prospective contract in accordance with the system. This does not mean that it's none of your business; it does mean that anything you do should be done in concert with the others on the pricing team.

A company doing significant business with DoD should have its cost accounting system reviewed and, if necessary, modified to conform to applicable rules and regulations, including the standards promulgated by the Cost Accounting Standards Board.

The ACO and the auditor are the key DoD figures in evaluating cost accounting systems. Acceptance of a system often involves some trade-off between practical simplicity and theoretical precision. If you feel that the existing system is inequitable, as exemplified by improper charges to the proposal you are evaluating, take your story to the ACO and to the Defense Contract Audit Agency (DCAA) auditor. Perhaps they can persuade you that there is no inequity when all other Government work is considered.

After discussions with the team's experts, you may feel that there is indeed long-run inequity in the existing system. If so, and if the team agrees, you all should start discussions with the contractor leading toward a change in the accounting system. Even so, you may end up by accepting the existing system for your current negotiation.

CHAPTER 7

How to Analyze Labor Rates

CHAPTER 7

HOW TO ANALYZE LABOR RATES

CONTENTS

7.1 Developing Wage Rates 7- 1

7.2 Projections 7- 3

7.3 Factors Modifying Wage-Rate Projections 7- 6

7.4 Use of Graphic and Computational Analysis 7- 7

There are two elements to consider in evaluating labor costs. One is quantity (the number of hours to be worked) and the other is price (the wages paid to those who do the work). We discussed evaluating the quantity of (1) direct labor in Chapter 5 and (2) indirect labor in Chapter 6. In this chapter we will discuss methods of pricing both direct and indirect labor. In particular, we will discuss methods used in projecting wage rates into future periods.

7.1 Developing Wage Rates

Cost Accounting Standard 401 requires that the practices used for estimating costs in pricing proposals be consistent with the contractor's cost accumulation and reporting practices and, conversely, that the practices used to accumulate and report costs be consistent with estimating practices. The grouping of homogeneous costs in estimates prepared for proposal purposes is not an inconsistent application of this standard.

The method a contractor uses to develop wage rates should be applied consistently. You should examine critically any special approach devised for an individual estimate. Ordinarily, the auditor will provide labor-rate information. However, you must know the factors the offeror considered in deriving that information.

Four general factors have a significant impact on labor rates: geographical location, skill levels, time period of the contract, and conditions in the contractor's work force. Your task is to ensure that estimated wage rates are for the types of labor that will be used and are fair and reasonable.

Wage rates for the same work vary widely among locations. This variation results from the supply-and-demand position in particular trades, the strength of particular unions, the area cost of living, and similar factors. Management may not have as much control over the wage rates paid for direct labor as it does over the number of hours required to do a job. Wage rates in comparable industries tend to equalize on a geographical basis, and, in some cases, on a national basis. You need to be sure that the wage rates used in a proposal are the ones that apply where the work will be done.

Quoted wages lend themselves to ready verification. Wage-rate information is available in Bureau of Labor Statistics indexes, in various indexes of average gross hourly earnings in the annual "Economic Report of the President," and in data published by state or local agencies. (Chapter 3 of this manual contains a section devoted to index numbers, their calculation and uses.) You should compare the wage rates proposed by the contractor with those in the published tables. The contractor should be asked to explain and justify significant differences. Data developed by a defense contract administration office may help.

Generally, as the degree of skill required increases, the period of training is longer and the wage rate is higher. This consideration applies particularly to trades involving similar work but varying degrees of skill, such as mechanic, fitter, and toolmaker. When the trades are dissimilar, additional factors help establish the relative level of wages paid, such as supply and demand in that particular trade, relative strength of the labor organizations, danger, and exposure to weather.

You should not accept a proposed wage rate unless it is consistent with the value of the contract effort involved. If the work could be done satisfactorily by mechanics, a wage rate for a higher skill level (fitters) is not appropriate.

You must know the methods of production the contractor plans to use and the nature of its facilities and equipment. You may need help from an industrial engineer in this. In addition, a defense contract administration office may provide technical specialists, and the Defense Contract Audit Agency (DCAA) may provide audit assistance to help you identify skills and costs.

Methods used to develop wage rates can be categorized as plantwide, departmental, labor category, or individual. Plantwide rates may be used by organizations producing a limited number of products that pass through all or most departments during manufacture. Departmental rates may be used by organizations with significantly different processes or operations that require varying degrees of skill, where wage rates vary widely among departments, and where the manufacture of products does not always require that work be done in every department.

To avoid an obvious danger, a plantwide or departmental rate should be a weighted average rate. To understand what can happen otherwise, consider the data in Table 7-1.

TABLE 7-1. WEIGHTED AVERAGE WAGE RATE

LABOR CATEGORY	FORCE EMPLOYED	PER-HOUR WAGE RATE	WEIGHTED WAGE RATE
Senior fabrication	100	$8.00	$ 800
Fabrication	200	4.00	800
Assembly	400	4.60	1,840
Quality control	300	5.00	1,500
Total	1,000		$4,940

Weighted average wage rate $4,940 ÷ 1,000 = $4.94.

You can derive a simple average wage rate by adding the rates for the four labor categories and dividing by four:

$$\$8.00 + \$4.00 + \$4.60 + \$5.00 = \$21.60$$

$$\$21.60/4 = \$5.40 \text{ simple average wage rate.}$$

But the $5.40 wage rate does not consider the number of individuals in each class of labor. Looking at the data, you can see that although the four labor categories employ different numbers of people, the simple average labor rate gives senior fabrication, with 100 employees, the same weight as assembly, with 400 employees. If everyone in the plant worked one hour, the labor cost for that hour would be $4,940. This figure divided by the number of employees, 1,000, yields a weighted average labor rate of $4.94. This $4.94 figure is $.46 below the simple average of $5.40.

In analyzing labor costs, consider the mix of labor to be used on the contract. If the labor mix is in exact proportion to the number of employees, use of the $4.94 wage rate is acceptable. However, if the distribution of labor in the contract differs, you must calculate the weighted wage rate using the number and mix of hours estimated for the contract, as shown in Table 7-2.

TABLE 7-2. WEIGHTED AVERAGE WAGE RATE

LABOR CATEGORY	NUMBER OF HOURS FOR CONTRACT	PER-HOUR WAGE RATE	WEIGHTED WAGE RATE
Senior fabrication	50	$8.00	$ 400
Fabrication	175	4.00	700
Assembly	125	4.60	575
Quality control	100	5.00	500
Total	450		$2,175

Weighted average wage rate $2,175 ÷ 450 = $4.83.

Rates by labor category are used primarily to estimate engineering labor requirements. This rate classification system is generally used in engineering-oriented operations to reflect the significant differences in moving from draftsman to project manager. This system is necessary because rates vary widely among categories and because each project usually requires a specific combination of engineering skills rather than a pro rata share of all levels.

Individual wage rates may be used when the project requires extraordinary skills demanding extraordinary wages. With this method, the offeror identifies which individuals will be assigned to the project, estimates the number of hours each will work, and applies the individual's wage rate to the estimated hours to compute estimated cost to the project.

Singling out expensive personnel is acceptable only if the company uses the individual-rate method on all business, including business where the required skills and wages may be lower than average.

7.2 Projections

There is no sure way to develop a correct wage figure under uncertain circumstances. Changes in skill levels due to retirements and increases or reductions in total force levels can affect wage projections. External forces, such as unexpected changes in the economic climate, changes in government policy, or a turn of events in international affairs, may completely alter the basis of the projections.

A common mistake in projecting labor rates is to correlate labor rates to the passage of time. In estimating future wage rates, people often look at historical rates. Time series graphs are prepared with actual wage rates on the vertical (y) axis and months on the horizontal (x) axis. If these rates have been following a clearly defined trend, there seems to be no reason to expect them to depart from that trend. However, this can result in significant error; many factors other than the passage of time will affect future labor rates.

Time-consuming calculations would be required to determine a wage rate for each month of a contract, multiply that rate by the effort in that month, and add all the monthly labor costs. To save time, an estimate of the cost of direct labor is often extended by multiplying the estimated number of labor hours by a single representative wage rate. To do this, you must determine the point at which to select that representative wage rate. This point is important because, characteristically, labor rates change with the passage of time.

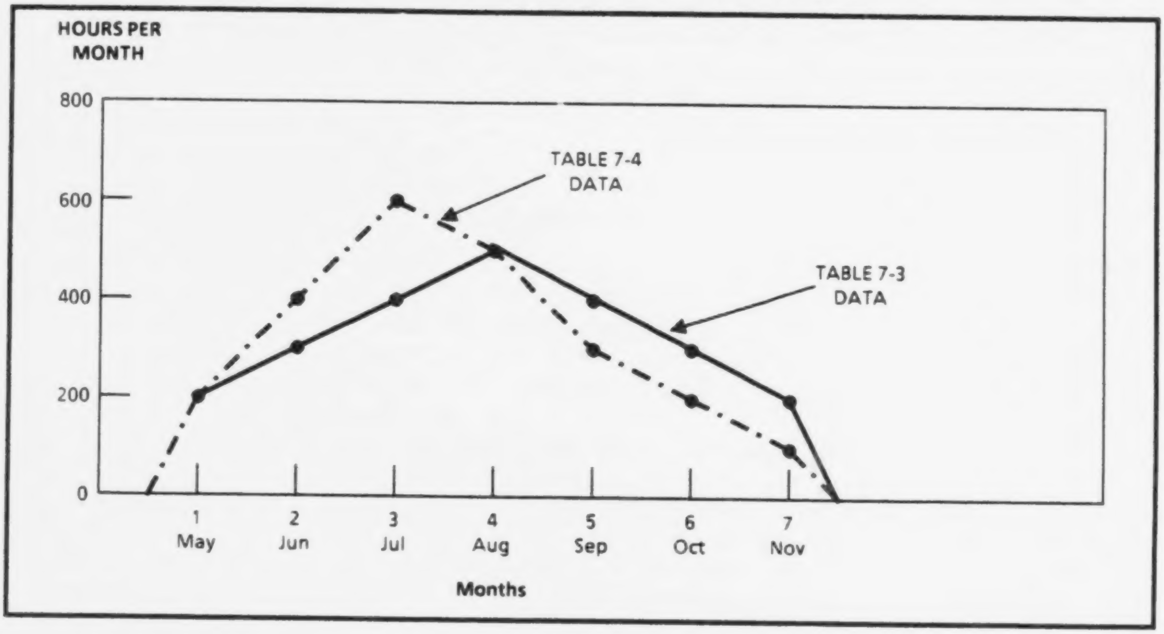
To determine the point to use, you need a labor-loading schedule reflecting the time sequence of labor-hour (day) expenditure. The schedule must consider such factors as date of award, production lead-time, delivery schedule, unit labor-hour requirements, and availability of personnel, equipment, and facilities. A contractor must have some sort of labor-loading schedule if its proposal is to make sense, even though the schedule need not be in great detail. The proper point at which to determine and apply an average labor rate is the weighted mean time of performance (weighted by the labor-loading schedule).

Assuming level production during each month, the midpoint of effort would be the mean of the labor-loading schedule hours. Consider the information in Table 7-3 (plotted on Figure 7-1). Step 1 would be to total the monthly hours (in this case, 2,300 hours). Step 2 is to determine the midpoint, by dividing the total hours by two (2,300/2 = 1,150. This amounts to 900 (May through July) plus the 250 hours in August needed to bring the total to 1,150. The midpoint in August is 250/500 or one-half the month = 15 August.

TABLE 7-3. DIRECT MANUFACTURING LABOR-LOADING SCHEDULE

MONTH	MAY	JUN	JUL	AUG	SEP	OCT	NOV
Contract delivery schedule		10	20	30	30	30	15
Labor-loading schedule (hrs)	200	300	400	500	400	300	200
Month number	1	2	3	4	5	6	7

FIGURE 7-1. LABOR-LOADING SCHEDULE



The estimate of future direct labor cost is computed by multiplying the estimated number of direct labor hours by a single representative wage rate at 15 August. In many cases, this may be the August average wage rate.

Let us consider a different direct manufacturing labor-loading schedule, but the same contract delivery schedule. This schedule, Table 7-4, also is plotted on Figure 7-1 and shows the difference in labor scheduling.

TABLE 7-4. DIRECT MANUFACTURING LABOR-LOADING SCHEDULE

MONTH	MAY	JUN	JUL	AUG	SEP	OCT	NOV
Contract delivery schedule		10	20	30	30	30	15
Labor-loading schedule (hrs)	200	400	600	500	300	200	100
Month number	1	2	3	4	5	6	7

These data show that more labor hours will be expended in the first half of the contract period than in the last half. Again, the midpoint is 1,150 hours (2,300/2). Totaling the monthly hours to 1,150 results in a different midpoint. May and June total 600 hours and addition of 550 hours from July brings the total to 1,150. The midpoint in July is 550/600 or 92 percent of the month = 28 July. In this case, a wage rate at the end of July would reasonably represent the midpoint of effort.

7.3 Factors Modifying Wage-Rate Projections

Companies ordinarily apply modifying factors to the latest actual individual, departmental average, or plant average rates. The factors may be straight-time rates or they may contain overtime or shift premiums. If premiums are included, you must evaluate the amount related to future operations to determine that the costs are minimized and to verify that the overhead rate is developed from an estimated labor base that includes premium pay.

The modifying factors include:

a. Potential increase or decrease of overtime and shift premiums.

b. Upgrading or merit increases.

c. Reduction in average rate caused by new hires.

d. Increase in average rate caused by layoffs.

e. Changes resulting from applying future across-the-board increases.

It is almost impossible to project future adjustments exactly because the effects of different modifying factors are not segregated statistically or in accounting records. In addition, future workload changes may or may not relate to historical changes. For example, projected new business may require lower-rated labor skills and result in rates lower than historic labor rates. Contractors may depict a history and general trend of wage rates and portray the effect of layoffs, expansions, and across-the-board increases on charts similar to those later in this chapter.

Two factors contribute to the increase of labor rates from one period to the next. One factor is the adjustment for increased productivity and a share of the resulting increase in profits. The second, the cost-of-living increase, tries to offset the diluting effect of inflation on purchasing power. This pattern of increase applies only to individuals with the same qualifications doing the same job.

In analyzing labor rates, make sure the categories of employees whose wages are being projected are the same as those expected to do the work on the contract. You will come up with strange numbers if you use average departmental rates to project engineering department labor costs when the proposed contract will require a disproportionate amount of the time of lower-paid draftsmen.

The contractor can influence labor costs on a given project by assigning to it lower- or higher-rated personnel. When available personnel are used, particularly in engineering departments, it is not uncommon to find that realigning them for maximum effectiveness causes substantial deviations in rates.

Whether this works to either party's advantage depends on how much the change in the number of hours worked (presumably more hours for lesser skilled workers) offsets the change in the wages paid. Even here, you should validate the assigned skills against work requirements, so that highly skilled labor is not assigned to tasks that require lesser skills.

You also will need to consider changes in the projected level of production. Usually, when labor rates are predicted by regression analysis, average historical rates are adjusted to eliminate the effect of changes in economic levels, and the adjusted rates are correlated with the plant population or the number of labor hours.

There are limitations to this procedure. Use it when the historical data included in the regression analysis are fairly recent and include the manpower levels anticipated in the future. When plant population declines, senior workers are likely to be retained, increasing the average wage rate; conversely, when plant population increases, the new workers will probably start at wages below the current average, thus reducing the rate.

Under these circumstances you may need to estimate the number of employees to be hired and separated and develop the average wage rates of employees in each category. In any projection of labor rates, you must consider the impact of expected changes in economic levels and employee mix, along with the impact of expected changes in the number of employees.

Union contracts, as well as management policies and practices, often provide for upgrading or merit increases for individual employees. Upgrading occurs between the base and ceiling rates for a labor classification, and by employee progression from one labor classification to the next. An expanding organization may experience upgrading as a requirement of its labor agreement; a stabilized organization may experience almost none.

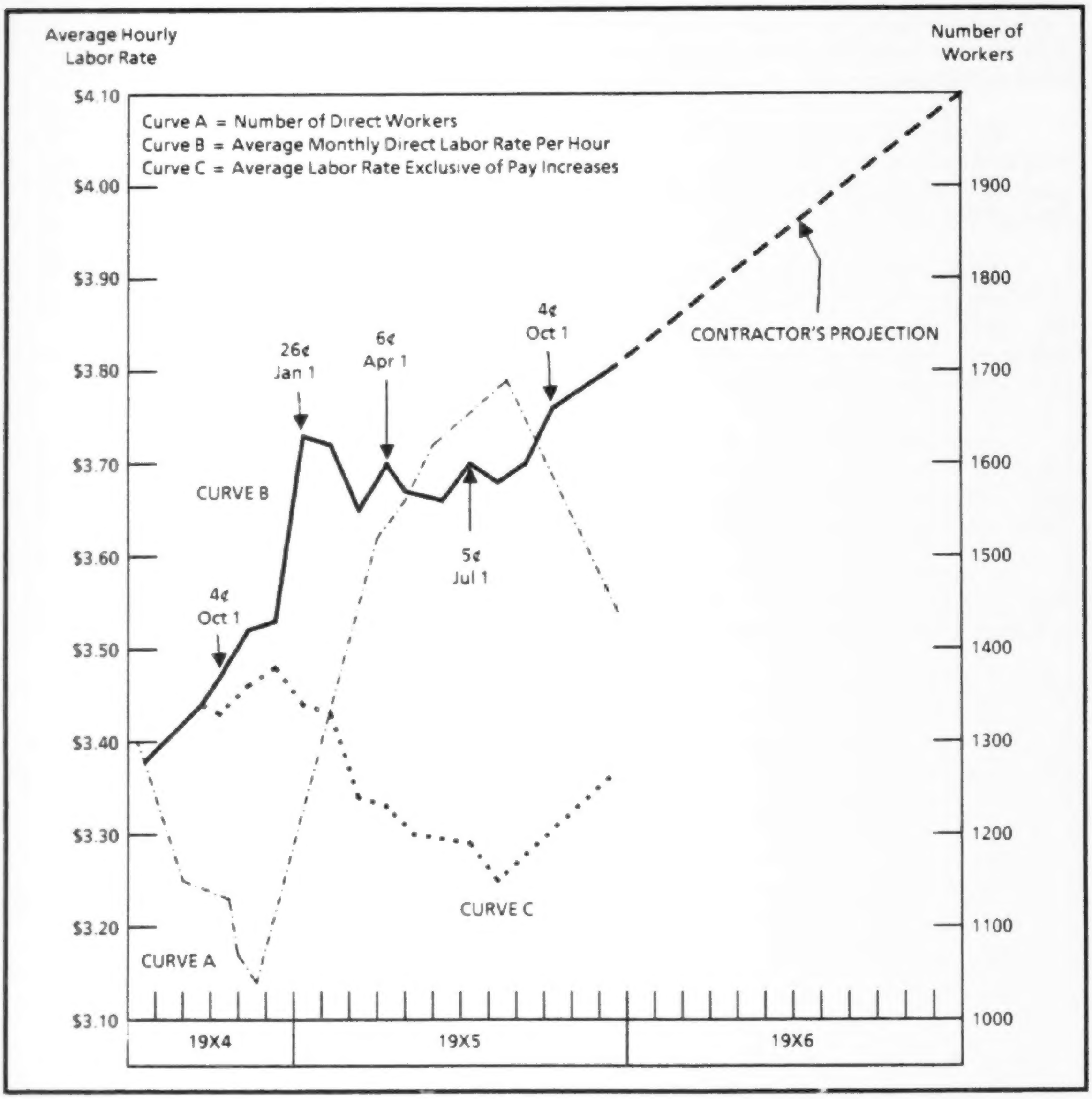
Sometimes you may have to guess about the probable outcome of a labor-management negotiation. Because there may be little connection between demands made and adjustments negotiated, trends based on actual wage rates usually will prove more equitable and realistic than trying to predict the outcome of the negotiations.

A possible exception to this general rule might occur in a period of economic recession, either national or industrywide. It might, in such a circumstance, be more realistic to project either a continuation of present rates or a downward trend.

7.4 Use of Graphic and Computational Analysis

The time series of Figure 7-2 graphically portrays hypothetical data on the number and average hourly rate of a contractor's direct factory employees for an 18-month period starting 1 July 19X4 and ending 31 December 19X5. The data depicted on the chart are shown in Table 7-5.

FIGURE 7-2. LABOR-LOADING SCHEDULE



Three lines and two scales are shown on Figure 7-2. The right-hand scale applies to Curve A, the number of direct workers employed each month. The left-hand scale applies to Curve B, the average direct labor rate per hour, exclusive of premium pay. The dotted line, Curve C, replots Curve B to eliminate the effect of general pay increases during the period. The example assumes that a general wage increase was negotiated as part of a two-year contract that took effect in January 19X5 and that the contract provides for quarterly cost-of-living adjustments.

The pay increases, the effective dates of which are indicated on the chart by arrows, total 45 cents during the period. The peak month of employment was August 19X5, when there were

TABLE 7-5. AVERAGE MONTHLY DIRECT LABOR HOURLY RATES AND NUMBER OF DIRECT WORKERS

(July 19X4 through December 19X5)

MONTH	AVERAGE HOURLY LABOR RATE	CUMULATIVE RATE INCREASES	ADJUSTED HOURLY LABOR RATE	NUMBER OF EMPLOYEES
19X4			(y)	(x)
Jul	$3.38	$ –	3.38	1,289
Aug	3.40	–	3.40	1,227
Sep	3.44	–	3.44	1,143
Oct	3.47	.04	3.43	1,128
Nov	3.51	.04	3.47	1,053
Dec	3.52	.04	3.48	1,022
19X5				
Jan	3.73	.30	3.43	1,117
Feb	3.72	.30	3.42	1,244
Mar	3.64	.30	3.34	1,419
Apr	3.69	.36	3.33	1,532
May	3.66	.36	3.30	1,564
Jun	3.65	.36	3.29	1,617
Jul	3.69	.41	3.28	1,652
Aug	3.67	.41	3.26	1,682
Sep	3.69	.41	3.28	1,613
Oct	3.76	.45	3.31	1,568
Nov	3.78	.45	3.33	1,513
Dec	3.80	.45	3.35	1,452

1,682 workers. The cumulative pay increases up to that time totaled 41 cents. Adding this increase to the July 19X4 starting rate of $3.38 would make a prospective average rate of $3.79 ($3.38 plus 41 cents) as of August 19X5.

At that time, however, the actual average rate, excluding overtime, was only $3.67. The decline of 12 cents ($3.79 minus $3.67) resulted from other causes, primarily the increase in the number of direct workers from 1,289 in July 19X4 to 1,682 in August 19X5. During the next four months, when the number of workers declined to 1,452, the trend was reversed and the rate increased 13 cents, 4 cents of which were accounted for by wage increases.

The contractor projects an increase of 2½ cents per month in the average hourly labor cost over the next year. This projection corresponds to the average experience for the last 18 months.

Two defects in this projection are obvious. One, the projected rate of increase reflects the general wage increase of January 19X5, even though the union contract provides only for cost-of-living increases during the forecast period. Two, no consideration is given to possible changes in the number of direct employees. It is apparent from Curves A and C that changes in the number of employees change hourly rates. However, the precise relationship between the two variables cannot be determined from Figure 7-2.

Figure 7-3 represents a computerized least squares curve fit (CURFI) program of the relationship between the data. After analyzing Figure 7-3, you may conclude that the adjusted labor rate tends to follow this equation:

Rate = $3.78851 - .000308967 x number of workers.

FIGURE 7-3. CORRELATION OF HOURLY RATES AND NUMBER OF EMPLOYEES

```
PROBLEM NAME: CURFI****
READY
10DATA3.38, 3.4, 3.44, 3.43, 3.47, 3.48, 3.43, 3.42, 3.34, 3.33, 3.3, 3.29
12 DATA3.28, 3.26, 3.28, 3.31, 3.33, 3.35
20DATA1289, 1227, 1143, 1128, 1053, 1022, 1117, 1244, 1419, 1532, 1564
22DATA1617, 1653, 1682, 1613, 1568, 1513, 1452
RUN
CURFI*              08:56                04/19/X6

PLEASE SPECIFY THE NUMBER OF VALUES (N) GIVEN AS DATA FOR THE TWO INPUT
VARIABLES, AND THE OUTPUT CODE (D).  (D = 1 IF OUTPUT IS TO BE IN ORDER OF
INCREASING VALUES OF THE INDEPENDENT VARIABLE, ELSE D = 0).  N,D = ? 18.0

                        LEAST SQUARES CURVES FIT

                            INDEX OF
     CURVE TYPE          DETERMINATION        A            B
1.   Y = A + (B*X)          .981048        3.78851      - 3.08967E-4
2.   Y = A*EXP(B*X)         .980928        3.81499      - 9.17163E-5
3.   Y = A*(X ↑ B)          .976782        8.12021      - .122216
4.   Y = A + (B/X)          .968533        2.96158        538.101
5.   Y = 1/(A + B*X)        .980662        .259973        2.72319E-5
6.   Y = X/(A + B*X)        .964573       - 47.3396       .332792

DETAILS FOR CURVE DESIRED (GIVE NUMBER) ?1
  1. Y = A + (B*X) IS A LINEAR FUNCTION. THE RESULTS ARE AS FOLLOWS:
X - ACTUAL             Y - ACTUAL        Y - CALC      PCT DIFFER
  1289                   3.38            3.39025       - .3
  1227                   3.4             3.40941       - .2
  1143                   3.44            3.43536                  .1
  1128                   3.43            3.44          - .2
  1053                   3.47            3.46317                  .1
  1022                   3.48            3.47275                  .2
  1117                   3.43            3.44339       - .3
  1244                   3.42            3.40416                  .4
  1419                   3.34            3.35009       - .3
  1532                   3.33            3.31517                  .4
  1564                   3.3             3.30529       - .1
  1617                   3.29            3.28891             0
  1652                   3.28            3.28781             0
  1682                   3.26            3.26883       - .2
  1613                   3.28            3.29015       - .3
  1568                   3.31            3.30405                  .1
  1513                   3.33            3.32104                  .2
  1452                   3.35            3.33989                  .3
```

The computations in Table 7-6 illustrate how the foregoing analysis might be used in evaluating proposed direct labor costs. Assume that the contract will be performed in the second, third, and fourth quarters of calendar year 19X6, with employment reaching a peak in the third quarter.

TABLE 7-6. ILLUSTRATION OF ANALYSIS

	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER
Estimated number of employees	1,500	1,650	1,450
Estimated average rates, based on regression analysis in Figure 7-1 (Jul X4 base)	\$3.32	\$3.28	\$3.34
Estimated cumulative increases since Jul X4 (45¢ in 4th quarter X5 plus 4¢ per quarter thereafter)	.53	.57	.61
Estimated labor rate	\$3.85	\$3.85	\$3.95
Estimated direct labor hours for proposed contract	62,000	119,000	31,500
Estimated total direct labor cost for proposed contract	\$238,700	\$458,150	\$124,425

In this example, the adjustment of historical data for pay increases was simplified by the fact that the union contract provided for uniform increases for all workers. If the increases had not been uniform, you would make a more detailed computation, based on the raises granted to each class of worker and the number of workers in each class. If the number of workers by class is not available, estimates may be based on samples of the workers.

Some contractors also grant union pay increases to nonunion workers. In such a case, the union agreement can be used to adjust the rates paid to nonunion personnel as well. Even at some plants that are not unionized, management grants across-the-board increases to employees to compensate for changes in economic levels. An adjustment of historical data for such increases can be made in the same manner as for union increases.

If you can't adjust average wage rates for economic factors by any of the methods described, you may find it useful to apply multiple regression analysis to the formula:

$$y = a + bx_1 + cx_2$$

where y is the average labor rate

x_1 is the number of employees

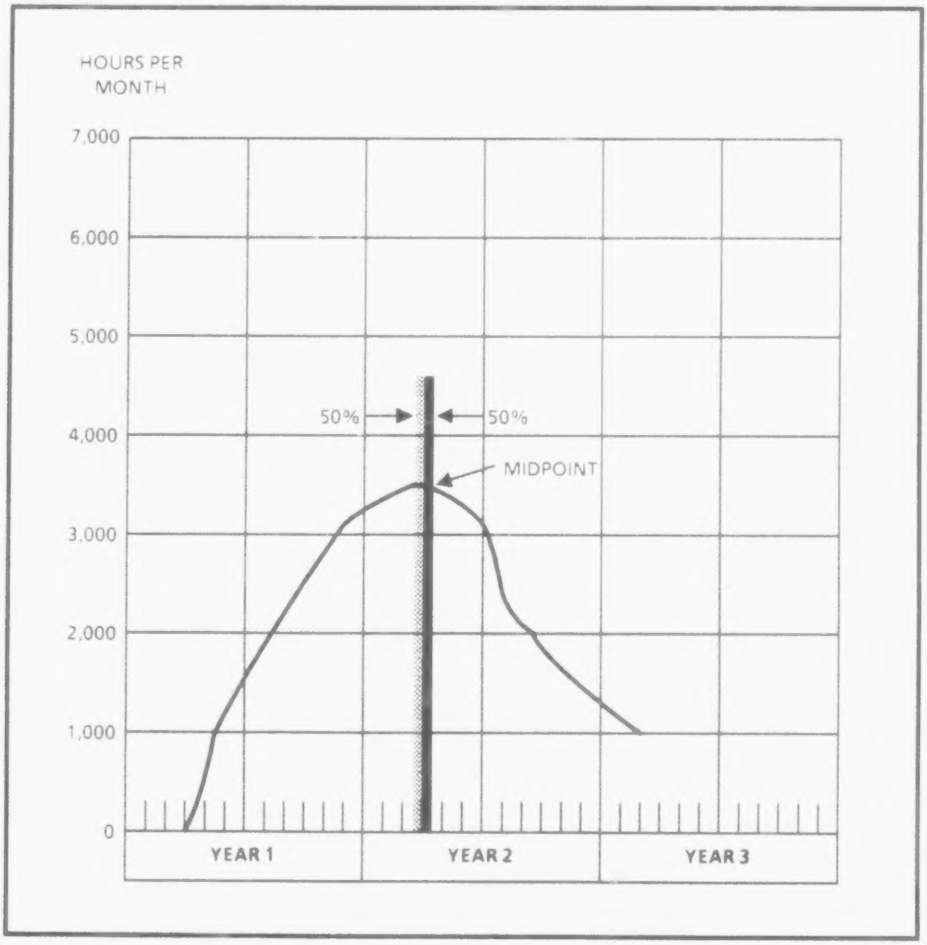
x_2 is a wage index and a, b, and c are constants (parameters) that minimize the sum of the squares of the differences between the actual values of y and values calculated from the formula.

This example illustrates a detailed approach and demonstrates the need for thorough analysis and proper interpretation of all data before making or evaluating a projection. It demonstrates the need for weighting this information and using it selectively with a graphic or other analytic technique.

The example demonstrates that the point from which projections are made and the slope of the projection line are equally important in forecasting probable future labor rates. It also shows that you need historical information covering a relatively long period to develop a realistic projection of future probabilities, and it underscores the need to review and interpret factual information to determine the most probable results.

The midpoint of manufacturing or engineering effort is determined by selecting the month that most closely represents the time when 50 percent of the direct labor hours will have been expended. The plotting of monthly direct labor hours tends to create a bell-shaped curve like the one shown on Figure 7-4.

FIGURE 7-4. LABOR HOURS BY MONTH



CHAPTER 8

How to Negotiate and Justify a Price

CHAPTER 8

HOW TO NEGOTIATE AND JUSTIFY A PRICE

CONTENTS

8.1 Competition and Price Negotiation . . . 8- 1

8.2 Written or Oral Discussions and Competitive Range . . . 8- 2

8.3 Price Negotiation Defined . . . 8- 4

8.4 Principles and Techniques . . . 8- 5
  Preparation . . . 8- 5
  The team . . . 8- 6
  Factfinding . . . 8- 8
  Objectives . . . 8- 8
  Prenegotiation review . . . 8-11
  Conference . . . 8-12

8.5 Negotiation . . . 8-12
  Price negotiation – a discussion of techniques . . . 8-12
  Negotiation of multi-item contracts . . . 8-14
  Tracking . . . 8-15
  Gamesmanship . . . 8-16
  Principles. . . . 8-17

8.6 The Need for Documentation . . . 8-19

8.7 Documenting Price Analysis . . . 8-20

8.8 Documenting Larger Procurements . . . 8-21
  Roles of team members . . . 8-21
  Requests for proposals . . . 8-22
  Requests for information and assistance . . . 8-23
  Recommendations . . . 8-24
  Reporting cost analyses . . . 8-26
  Reports after negotiation . . . 8-27
  Distribution of PNM. . . . 8-33

8.1 Competition and Price Negotiation

Contract price negotiation usually is required when competitive proposals have been solicited and always is required when other-than-competitive procedures are used to acquire goods and services. Exceptions to this principle are set out in acquisition regulations, but the message is clear: only when contracting through sealed bidding can you expect not to bargain with offerors before awarding a contract. Price negotiation is not required and in fact has no place in sealed bidding.

Competitive acquisition by sealed bidding works because there are many sellers that can furnish the product or service to be procured (and there are many sellers because there are many buyers for their wares). The presence of many buyers and many sellers creates the marketplace in which competition prevails, and competition sets the price.

Competition can be created, even when there is no marketplace and there may be only one buyer, by describing the required product or service in terms that more than one seller can meet. With expectations of significant present and future sales, many will try to get into the business and there will be head-to-head competition for at least the first quantity.

With several responses, you usually will need to negotiate, to hold written or oral discussions with all in the competitive range. Unlike sealed bidding, selection and award are separate actions. Final negotiations are conducted with the selected offeror or offerors, and award is made after agreement is reached on terms and conditions, including price.

8.2 Written or Oral Discussions and Competitive Range

Contracting officers are required to conduct written or oral discussions with all responsible offerors that submit proposals within a competitive range. The few exceptions to this requirement are enumerated in the acquisition regulations. Written or oral discussions need not be undertaken when the existence of full and open competition or accurate prior cost experience with the product or service assures that acceptance of the most favorable initial proposal without discussion would result in a fair and reasonable price.

If this exception is to be used, the solicitation document has to have notified all offerors of the possibility that award might be made without discussion. An award on this basis must be made without any written or oral discussion with any offeror; if discussions are opened with one offeror, they must be opened with all.

The concepts *written or oral discussions* and *competitive range* have been difficult to define and deal with because their application, in most instances, is based on judgment. Written or oral discussions are said to lead to leveled proposals where price becomes the sole discriminator and auctioning occurs. Leveling is said to occur when discussions lead to a transfusion of the best features of each proposal into all other competing proposals, although leveling can occur without transfusion. The nature and content of discussions with offerors are critical factors, and leveling must be avoided.

Your discussions should not disclose the strengths or weaknesses of competing offers, nor should they disclose any information that would let one offeror improve its proposal at the expense of another.

You must determine which proposals are within a competitive range using price or cost, technical, and other salient factors stated in the solicitation and must include all proposals that have a reasonable chance of being selected for award. You shouldn't determine competitive range by comparing an offeror's score (after its proposal has been evaluated) with a predetermined score that was structured before or during source solicitation.

You should examine the grouping or arrangement of scores for all proposals. Borderline proposals should not be excluded from consideration if they are reasonably susceptible of being made acceptable. Another way of putting it is this: a proposal must be regarded as being within the competitive range unless it is so deficient or out of line in price or technical merit as to preclude further meaningful negotiations. Where an offeror's failure to provide detailed information renders its proposal inferior but not unacceptable, the proposal should be considered within the competitive range for written or oral discussions.

In the case of an RFP that solicits unpriced technical proposals, you evaluate proposals to determine those that are acceptable or that, after discussions, may be made acceptable. After discussions, prices are solicited for all acceptable proposals.

No proposal from a responsible source offering an acceptable technical proposal is to be rejected for failure to fall within a competitive range unless the technical proposal includes a price proposal that, for good and sufficient reason, is found to be so deficient or out of line as to preclude further meaningful negotiations.

All offerors selected to participate in discussions (those whose proposals have been determined to be within the competitive range) are to be advised of deficiencies in their proposals and given a reasonable opportunity to correct or resolve them. A deficiency is defined as that part of an offeror's proposal that fails to satisfy the Government's requirements. Advising an offeror of a deficiency in its proposal does not mean that it will be told how to correct it. That decision and what to do about it is strictly up to the offeror, and the correction or resolution of deficiencies may require an offeror to submit revised cost or pricing data.

In this difficult and demanding environment, offerors must not be played against each other. Auction techniques must not be used. Examples of auctioning include indicating a price that must be met to obtain further consideration, informing an offeror that its price is not low in relation to another, or repeatedly calling for best and final offers.

At the conclusion of discussions with offerors within the competitive range, you set a final, common cutoff date for the submission of written final offers. You notify all remaining eligible offerors of the cutoff date and allow sufficient time to prepare and submit competitive offers. If your notification is oral, you must confirm it in writing. This notification must say, in effect, that discussions have been concluded and offerors now are being given an opportunity to submit best and final offers.

Final contract negotiations differ from written or oral discussions held previously. Generally, written or oral discussions are conducted to obtain information for evaluation and selection purposes. Final contract negotiations use that and later information to establish the contract terms.

Application of the concepts of *written or oral discussions* and *competitive range* may be different for major systems and equipments than for other items and services. But whether it is a large or less-than-large procurement, the fundamentals should not be applied differently.

In summary, there are six steps in the process of reaching final contract negotiations after the receipt of proposals or offers:

a. Evaluate and rank offers in light of the evaluation criteria specified in the solicitation.

b. Identify the proposals that are within a competitive range.

c. Identify and eliminate unacceptable proposals (those containing such deficiencies in price and/or technical merit as to preclude further meaningful negotiations).

d. Conduct written or oral discussions with the offerors identified in Step 2, and, if necessary, permit revision of individual proposals in order to correct deficiencies.

e. Notify each offeror with which discussions have been conducted of a final, common cutoff date for submission of written best and final offers.

f. Select the source or sources for final negotiation and award.

8.3 Price Negotiation Defined

Price negotiation puts the cap on the process of negotiation. Negotiation -- the process of bargaining among buyers and sellers -- is the way to prove to the contractor the reasonableness of your findings and conclusions. Bargaining requires communication and implies a willingness to reach a mutually satisfactory agreement on, or settlement of, a matter of common concern. Communication may be in writing, by telephone, or face-to-face. If face-to-face, it may be an informal conversation or a more formal conference.

Price negotiation is a technique used in the absence of effective price competition to reach a sound decision on price. That is its purpose. When you use this technique, your objective obviously is a fair and reasonable price and a contract type that will sustain the price. However, your immediate reason for negotiating is to find a basis for agreement with the offeror.

There are two parties to the negotiation. You represent the Government, and it is in your interest to make a contract that promises to pay the contractor a fair and reasonable price for delivering the needed equipment or service on time. You are trying to create a contract that will encourage this and also encourage the contractor to control and then reduce the costs of contract performance. You balance price and quality and try to get the required quality at the most reasonable price. This may mean the lowest price, or as low as possible under the circumstances.

On the other hand, the offeror has different objectives based on factors of great interest to it. While profit surely will be one of those objectives, its importance can diminish in specific situations. You may or may not learn what these objectives are during negotiations, but this is not critical. The important thing to remember is that the company and its representatives will probably be trying to achieve objectives different from yours.

The negotiation of price, therefore, should establish an area within which you and the company can agree, an area that will allow both you and the company to realize your separate objectives. The sense and soundness of this observation may not be apparent. To clarify it, we'll look at an example.

Garsap proposes to furnish 100 M-2 automatic electrogyros at a firm unit price of $6,000. The Government objective is $5,140 each on an FFP contract. This $5,140 is the figure the negotiator wants to reach after discussions with Garsap. The task seems formidable, and no doubt will be; the 14-percent spread between the objective and the company's asking price is a significant difference of opinion and, seemingly, of objectives. Negotiations will explore known facts with the company's representatives so that the Government negotiator, Tammy Watkins, can test her interpretations of the facts. It will also be Tammy Watkins' purpose to get from the company the latest information about costs incurred (if any) since Garsap prepared its offer. It is likely that the exploration will produce factors that will cause Watkins to revise her objective upward and the company to lower its asking price.

It is also likely that the resulting difference between the two positions will be the range within which agreement can be reached. The price finally agreed to will be one that Watkins thinks is reasonable for the M-2 gyros and one that Garsap will accept as sufficient for its purposes. We must assume, in the absence of certain knowledge to the contrary, that Garsap will be interested in making a profit on the sale and that the company will be satisfied that it can make an adequate profit at whatever price it ultimately agrees to.

8.4 Principles and Techniques

In this section we will talk about the principal steps and techniques of negotiation under the following headings:

a. Preparation.

b. The team.

c. Factfinding.

d. Objectives.

e. Prenegotiation review.

f. Conference.

The central theme of this section may sound naive and quaint, but if you retain only one idea, make it this: be prepared. In other words, make sure the offeror submits the necessary cost or pricing data, and make sure that you do your homework, check your facts, prepare your case, have an objective, anticipate arguments, and develop responses.

Sooner or later, before you make an award, you will have to talk price with a person who will be arguing that the offer is reasonable and probably too low for safety. You may view the price as too high, but even if you are right, you'd better have good reasons handy to sell the offeror on the idea that it won't lose everything but will make an adequate and equitable return at your price.

You will be meeting with a person who has strong feelings of self-interest and the future. No matter how patriotic and public-spirited the individual, the offeror's first interests must be perpetuation of company and job and furtherance of career. The offeror will be prepared to argue for the price and contractual arrangement offered. Your task will not be easy, no matter how well you prepare, but you won't have a chance with a haggling "Your price is too high. Knock 10 percent off and I might be able to buy it."

Haggling and horse-trading suggest pushcart peddlers, oriental bazaars, and sharp practices. They are more elementary forms of negotiation in which the buyer must truly beware. Your negotiations should have little in common with any of these. However, you should remember one thing: the buyer who knows what he wants, knows how to test the quality of offered goods, and has a basis for determining value does not get taken even when buying horses.

Preparation

Preparation includes getting cost or pricing data from the company, analyzing the offer, doing additional factfinding or verifying, developing a Government position regarding the offer (a negotiation objective), and planning, in general terms, the strategy for the impending negotiation conference.

Your strategy should be based on a thorough understanding of the characteristics of the industry and should be tailored to the situation and the company. The depth of preparation and the number and kinds of people you line up for the negotiation team will depend on the importance and difficulty of the proposed procurement, the money involved, and the time available. It may also depend on the degree of price competition obtained.

The team

For significant procurements, the help of specialists will be needed in preparing for and conducting the negotiation. While you will either do the job alone or use only limited outside help for most relatively simple, small-dollar procurements, the pricing of more complex procurements cannot be a one-man show.

You may need help in evaluating kinds and quantities of material and recent purchases and in projecting that price experience into the future. You may need help in determining the need for certain types of labor and the realism of the hours projected and the prices anticipated. You may need help in analyzing risks and determining the present stage of development of the item, the amount of work yet to be done, the likelihood of success in solving state-of-the-art problems, or the similarities and differences between the present requirement and the equipment that preceded it.

If buying repair, modification, or maintenance of existing equipment, you may need help in assessing the probable or actual condition of the equipment to be repaired or modified or evaluating the record of work done earlier on the same or similar equipment. You may be looking for help in evaluating the reasonableness of the present level of an offeror's indirect costs and the projection of indirect costs into the future. You may want help in interpreting engineering drawings of the equipment to be procured so as to visualize the manufacturing processes required or determine whether the offeror can do the job within the hours estimated.

No matter what the problem, specialists in pricing, auditing, production, packaging, maintenance, quality control, contract administration, contract law, and various fields of engineering are available within the organization or within the Government. The real concern is how to use them and how to plan so that they will be available when you need them.

The team is not a formal, identifiable organizational entity. Instead, it is a group created by the person responsible for developing the Government's negotiating objective and plans. It lasts until the contract has been negotiated and awarded, and then it is disbanded.

The PCO, the contracting officer assigned responsibility for making the procurement, is the team chief. The PCO provides overall knowledge of the procurement situation, special contract clauses that may influence prices, past buys of the same or similar equipment, experience with the offeror or offerors, and similar factors.

The PCO may or may not be the principal negotiator. The choice of negotiator will depend on organizational concepts, duty assignments, and obviously, the skills available. The PCO may or may not take charge in the planning, analysis, and factfinding stages. No matter how these duties are handled, the PCO will provide team leadership as the one responsible for the contract.

If the buying organization has contract price analysts, one of them should support the contracting officer. The price analyst should ask for field pricing support and assimilate analyses of costs from the ACO (and others assigned to the contract administration organization), the auditor, the project engineer, and other specialists.

The pricing specialist may be in the best position (from experience and ability) to conduct the price negotiation. If so, the specialist should be named the principal negotiator. The rule is that the best person does the talking for the Government. However, when the best negotiator is not also the team chief, the negotiator must wait for the contracting officer's nod before signing off.

The ACO is the contracting officer assigned the responsibility for administering any resulting contract. The ACO and the field pricing team will furnish assistance to the PCO on request. Using a team of specialists, the ACO reviews the proposal and reports back to the buying organization.

Specialists can evaluate the following: the need for the kinds and amounts of material and labor supporting the proposal; the indirect expense rates, particularly if a forward pricing rate agreement has been negotiated; the need for special tools and test equipment; the requirement for and the cost of particular kinds of preservation packaging; the need, if any, for financial or facilities assistance; and the reasonableness of scrap and spoilage factors.

Equally important is a summary of the total field review effort. These separate cost analyses will be based on knowledge of production, quality control, packaging, engineering, and manufacturing practices and techniques, and on information about plant capacity, scheduling, engineering and production skills and experience, make-or-buy, Government property, and industrial security as these factors relate to the offeror.

When asked, the auditor performs a cost analysis and reports findings to the ACO for transmittal to the PCO. The report covers both incurred (if any) and estimated costs. It includes advice about disclosed accounting practices, about cost or pricing data submitted and identified, and about the appropriateness of accounting methods to the requirements of the contract type contemplated. It also describes any other characteristics of the system that the contracting officer should know about. If the reports of specialists included conclusions about amounts or kinds of material and labor, the significant findings will have been given to the auditor. The auditor also identifies all cost or pricing data that the contractor submitted in writing during the conduct of the analysis.

These analyses reports are bundled up and sent, with the ACO's summary comments, to the PCO. Each specialist reports things as he sees them, interpreting facts and making judgments on the basis of his specialty and in light of his experience. Ultimately, these reports need to be studied and digested and conflicts resolved.

The PCO, or the individual who will negotiate with the company, should be the one to do the digesting. The Government negotiator will have to discuss all relevant points with the company's negotiators and must know and understand any compromises or other resolutions of differences, first among the Government specialists and second, between Government and company positions. If all the differences relate to questions of fact, it might not be necessary for the negotiator to be in on their resolution. But when it is a matter of opinion and judgment, the more he knows about the details, the better.

(There are special requirements and procedures for resolving situations when the contracting officer's proposed disposition of contract audit report recommendations differs significantly from the recommendations themselves. These are covered in DoD Directive No. 7640.2.)

The project engineer should contribute knowledge of design and of the offeror's technical approach as these influence costs and should have opinions on materials and engineering hours, particularly. However, the opinions, as well as those of all other specialists, must not be accepted without evaluation and testing.

The ACO convenes a team when given responsibility for completing certain pricing actions. The team functions in the same manner as described for the PCO. The ACO, or a pricing specialist, should request input from the auditor and other specialists. On certain repetitive jobs, the team usually will follow standard procedures developed locally to handle certain kinds of jobs. Spare parts and support equipment lend themselves to a standard approach.

The pricing team has only one spokesman. This may be the contracting officer, a contract specialist, or a price analyst. One spokesman means one quarterback to call the plays; it does not mean a one-man effort. The specialists are there to help the spokesman.

During factfinding they feed questions as the company's representatives explain their position. One of the specialists may take over at the spokesman's request and handle the inquiry into the factual basis for projections of certain costs. Specialists listen, and during recesses suggest areas for further exploration and recommend conclusions regarding types and amounts of costs.

In the final negotiation session, the roles are much the same; the spokesman is still calling the shots, and the others are standing by to help and counsel. But at this point the spokesman is less likely to let others do much talking, except during caucuses. The principal reason for this change is that it becomes tactically more critical for the team to present a single front and move in a single direction; this is sometimes difficult when there is unrestrained participation. We will return to this point later.

Factfinding

Factfinding closely follows the first analysis of an offer. When cost analysis is required, this first analysis breaks the proposal apart and lays open its details for searching examination. The first cut raises questions and reveals areas to be explored in detail.

As the name says, you look for facts to establish comparability with other products or services so as to be able to analyze the price or prices offered. When cost or pricing data are submitted and cost analysis is required, you go for two kinds of facts. First, you want to establish the actual costs of doing the same kinds of tasks, one benchmark against which you measure the probable future costs under the upcoming contract. Second, you try to isolate the assumptions and judgments the offeror has actually made in getting from indicated current to probable future costs.

Factfinding may be done in several ways. If the problems are defined clearly, you may be able to set down questions to ask and specific facts and analyses to develop and let specialists do the digging. You may have to go over the proposal with the offeror's estimators, engineers, accountants, production people, and others to understand their problems and their approaches and to know where to look in greater depth. Such preliminary negotiations are not intended to end in an agreement on anything, although a factfinding session could end in an understanding or agreement on the factual basis from which the offeror projected the costs of contract performance.

Factfinding may be the first stage of a two-stage negotiation conference, with a short interval between stages to permit the Government negotiator to evaluate the facts, establish a negotiation objective, and get necessary clearances. This might be the procedure on smaller, less complicated procurements where considerable historical data, including prices, exist. For other procurements there may be a very clear break between factfinding and negotiation -- a recess taken to run down leads, make necessary explorations, and digest the acquired information.

Objectives

Factfinding should resolve all questions of fact and all disagreements about cost or pricing data. Hopefully, the remaining areas of disagreement will be staked out and the dollars at issue identified. The differences that exist now are differences of opinion as to value, as to what will happen, and as to the significance of particular facts. Points of view asserted in the final negotiation may still lead to some changes in your ideas about a fair and reasonable price, but the relative positions are fairly well defined.

In addition, you probably are not firmly committed to one set of ideas about costs, profits, and price. For example, you may have defined the possibilities and come up with different prices for different situations. One would be the price if all went well and if certain machining processes worked out as hoped. Another would be the price if all predicted events took place but not as soon as hoped for. A third might be the "worst case" situation. These possibilities and the associated probabilities reflect the relative uncertainties of the procurement and help you measure your confidence in any given estimate.

On the other hand, the issues might not be clearly defined and the achievement of a certain cost level will depend not on any breakthrough or fortuitous combination of circumstances but rather on how well the offeror can do the job and control costs. You know that you are dealing with estimates and probabilities, and that actuals can and probably will vary from what you think is a really tight and good estimate.

You are dealing with a range, therefore, and you are trying to create a contractual climate in which the company will control and then reduce costs at the same time it maintains quality and makes timely delivery. You should express your objective as a number and qualify that number with a range of probable outcomes.

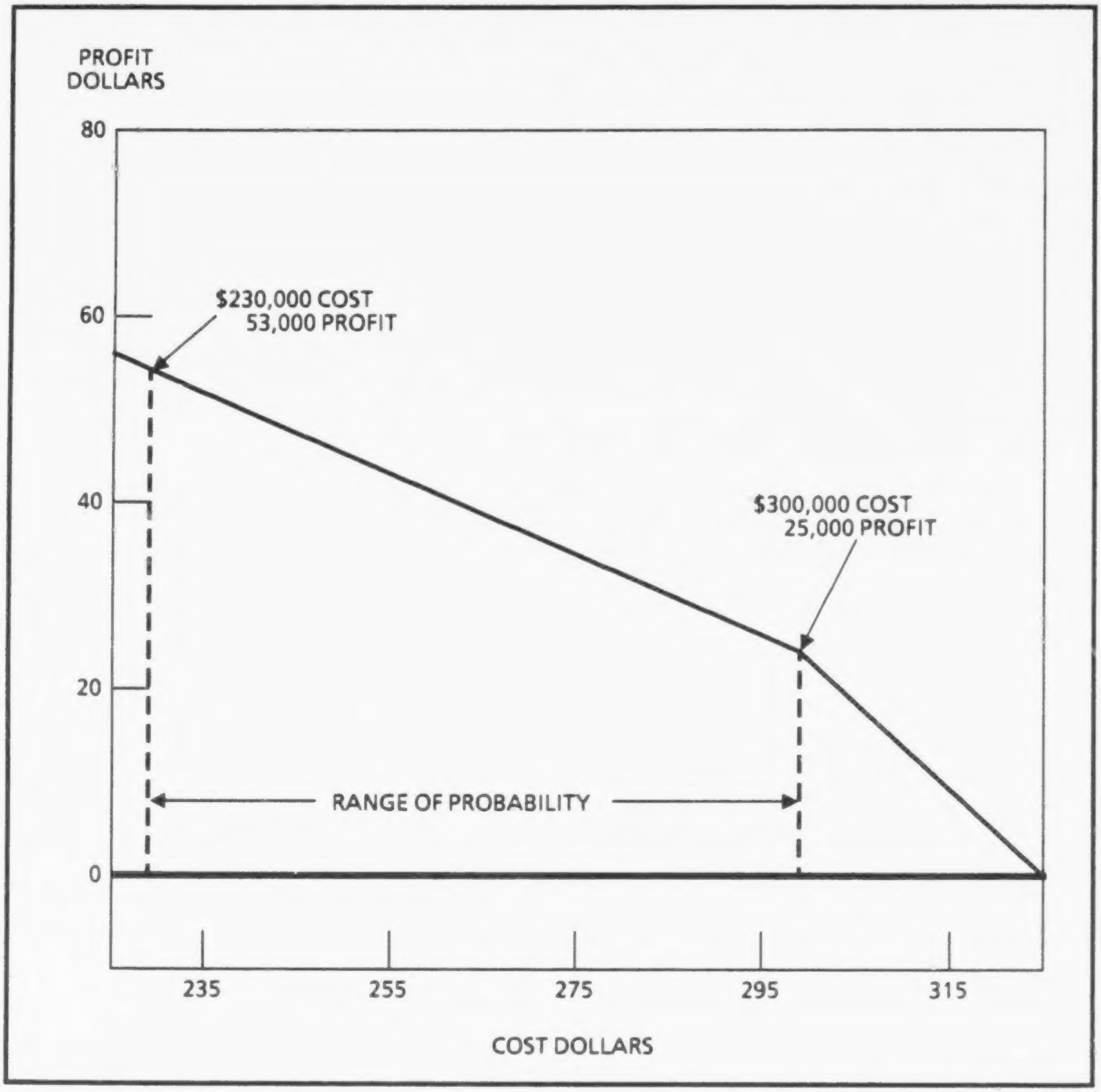
For instance, you may have concluded that the work should be done for $275,000 but you also acknowledge that the final cost might be as low as $230,000 or as high as $300,000. If these expectations are reasonable, you should tailor the proposed contract to them. A further consideration must be the company's offer and what you think the company is likely to accept, but this should influence your strategy, not your objective. If you expect it will be hard to sell your objective to the company, you should have various contract packages ready to offer.

When you acknowledge that you are talking a range of costs or prices rather than a single final cost or a single objective, you open up some interesting areas. Going back to the $275,000 figure, assume that you think an incentive arrangement fits the situation, and assume that you tailor it this way:

Target cost	$275,000
Target profit	35,000
Target price	$310,000
Ceiling	$325,000
Share	60/40

Assume also that the range of your cost expectations is $230,000 to $300,000. (If $275,000 seems too small for an incentive contract, add another set of zeros.) This arrangement is illustrated in Figure 8-1.

FIGURE 8-1. PROPOSED FPI CONTRACT DEMONSTRATING RANGE OF PROBABILITY



If this is your counteroffer, you are in effect saying that you are willing to write a contract with this arrangement:

Target cost	$230,000
Target profit	53,000
Target price	$283,000
Ceiling	$325,000
Share	60/40

Or this:

Target cost	$300,000
Target profit	25,000
Target price	$325,000
Ceiling	Same
Share	0/100 overrun 60/40 underrun

Or an arrangement using any other combination of cost and profit read off the chart.

With these factors of plus 9 to minus 16 percent from target of $275,000, an FFP arrangement probably would not be a reasonable alternative. Your objective would be FPI and your negotiation flexibility would come from variations in targets, share, and ceiling. Of course, you may change in the negotiation conference.

For example, assume you recheck all the facts and conclude that a more realistic estimate is $280,000 and that the probable variation is plus or minus 4 percent. In this case, you might propose an FFP arrangement of $310,000 or $315,000. Because you are offering a price well within the range you had when you went into negotiations, it is the narrowing of the range of probable variance from estimate that gives you the confidence needed to talk FFP. The numbers are the same, but your evaluation of the situation has changed significantly.

Prenegotiation review

This talk about the negotiation conference illustrates some characteristics of an objective and some things that might cause you to agree to an arrangement different from the one you went in with. Let's back off for a moment and discuss a vital step that should be taken between the time you come up with a price objective and the time you enter into negotiations with the offeror.

Good sense tells you to touch base with your superior, to tell your boss about your objective, how you developed it, and why a contract within some range of that objective would be a reasonable proposition. However, chances are that the decision to touch base is not yours to make; most procurement organizations require some supervisory review before starting negotiations or consummating an agreement.

The larger the procurement, or the more important and far-reaching it may be in its effect, the higher this review will go in the organization and the more formal will be its requirements and procedures. The principle is the same, however, regardless of level.

The review is conducted so that management (your boss) can be assured you have done your homework and are entering into negotiations with a well-conceived and realistic plan. From your point of view, the advantage of the review is the opportunity to get policy guidance and management support in the handling of particular problems. Don't discount the chance it gives you to show your abilities, either.

The review can be a five-minute rundown of the facts and the objective if it is a small deal and if you're talking to your immediate supervisor. It can be a formal, flip chart/vugraph presentation by the team to an assembly of top procurement managers. It can be a written justification and request for clearance to proceed. From your point of view, departmental regulations will have set up the requirement and you will have no choice.

Your interest is in selling management on your intentions, taking care not to box yourself in on a specific, single objective. You must have room to negotiate, freedom to move up or down from your objective as the facts and circumstances change in negotiation. You might well want to suggest, if no one else does, that you check back before reaching agreement if the arrangement you are prepared to accept is significantly different from any of the alternatives discussed in the prenegotiation review.

Conference

We've said that there may not be a clear break between the factfinding session and the negotiation conference. Before beginning the negotiation conference, you will explore, develop, and confirm your understanding of facts, what conclusions, if any, are conjectures based on your interpretations of the facts, and what the areas of disagreement are, as well as their dollar magnitude. Having done these things, you will have established the basis for agreement because you will know if a reasonable, realistic contract is possible.

8.5 Negotiation

Thus far we have addressed essentials of contract price negotiation. The rest of this chapter is devoted to ideas you may find useful in conducting contract price negotiations.

Price negotiation – a discussion of techniques

Broadly speaking, there are two ways to negotiate agreement on a contract price: (1) cost element by cost element or (2) total price. When analysis of estimated costs is not required, the second way is the only possible way. When cost analysis is performed, both ways are open. Nevertheless, only one, total price negotiation, is the technique to use.

Your task is to establish a price objective by:

a. Careful review and evaluation of the estimated costs supporting the offeror's price proposal, element by element and in total.

b. Evaluation of current and past prices for the same or similar product or service.

c. Value analysis or eyeballing.

d. Factfinding. You discuss and question cost elements, profit, design and production problems, delivery schedule, and data requirements; in short, any and all matters likely to influence the cost of performing the contract. You do this with the offeror to understand the factual bases for the proposal, the estimating assumptions, and the factory, engineering, purchasing, and administrative operations represented by the costs.

e. Establishing, with the help and agreement of a pricing team and the concurrence of management, a price objective.

With a price objective and management's go-ahead, you can start the negotiation conference. Your efforts are directed toward reaching agreement with the offeror on all contract terms and conditions, saving price and pricing arrangement for last.

Good technique says you will summarize the relative position of each party and review and restate the facts as verified during factfinding. You will point out specific areas of difference as to costs and present the facts and judgments that support your position and your counterproposal. To move from there to agreement, you do not have to get the offeror's separate agreement on an exact value for each element supporting the price.

To put this in perspective, consider that both you and the offeror usually start negotiations with separate understandings of the significance of the cost experience (relevant data showing what it has cost to do work similar to the proposed contract task) and of estimates of the cost of the new work.

Cost experience is factual and serves as the basis for the offeror's cost or pricing data. These data must be accurate, complete, and current and usually are derived from the company's books and accounting records. Auditors can tell you whether the books and records display costs accurately and are therefore not misleading. Because you are dealing with facts, there is no reason for you to disagree on what costs have been or on how these costs should be distributed.

The second factor -- estimates of the cost to do the new work -- is essentially a judgment about the company's future performance and its ability to control and reduce contract costs and how likely some events are to occur. In evaluating estimates, you must reach conclusions about future events, consider probabilities, and weigh the cost impact of divergent actions. This means you must depend on cost projections and trends and assess how risks should be distributed, how much potential there is for cost reduction, and how you can use this potential in negotiating price. These assessments require judgments on matters that cut across individual cost elements and may be unrelated to any specific cost element.

There are obvious reasons why you and the offeror will differ in your views of future events. You are expected to work toward an objective that will require the contractor to exert positive efforts in order to earn a fair profit. In presenting your version of a reasonable price, you tend to minimize the difficulties and the likelihood that unfavorable events will occur.

On the other hand, the company can be expected to work toward achieving a negotiation objective based on the occurrence of what it asserts will be unfavorable events. You rarely will agree with the contractor's estimates, and the contractor will not often agree with yours. However, both estimates should be founded on the same factual basis. Further, both parties should bargain in the understanding that the total of an estimate is a sum of possibilities, not certainties, and they should recognize that a compromise of extremes may be necessary to a fair settlement.

Viewed in this perspective, it becomes clear that you may severely hamper negotiations if you attempt to reach a separate agreement on each cost element. Separate agreements are uneconomical and tend to lead to higher prices for the following reasons:

a. Separate agreements generally are consecutive rather than concurrent. This makes it difficult to give proper consideration to pricing possibilities that cut across cost elements. You tend to lose sight of important relationships between cost elements. Further, it is wasteful of time and money to agree on element *A* only to find in negotiating *B*, factors that cause you to reopen *A* and then, having agreed to *A* and *B*, to find in negotiating *C* that you must reopen *A* and *B*, and so forth. A worse consequence of this tangle is the frequent failure to see the need to reopen discussions on earlier elements. This failure generally results when you lose the ability to separate the important from the unimportant.

b. Separate agreements frequently cause other substantial delays in negotiations, in addition to those just described. Bargaining impasses on a number of separate cost elements can result. Reasonable trade-offs are discouraged, and the offeror insists on contingency allowances for each cost element rather than a reasonable contingency factor applicable to all elements. You tend to lose bargaining power in those areas where the offeror is unyielding if you have already agreed on elements where the offeror is relatively acquiescent.

c. Separate agreements on individual cost elements keep you from reaching a proper balance among the other elements of the contract pricing arrangement, all of which are interrelated and each of which is related to the total cost estimate. All these elements (price, contract type, profit sharing arrangement, and any limitations on profit or price) must be balanced if the price is to be a sound one.

d. Separate agreements are apt to lead to bad pricing. The end result might be a seductively flawless package of discrete cost elements with the cost experience and cost projection factors, including contingencies, precisely defined for each element. All you need to do is add a profit element and the price is complete. Herein lies the seduction: everything adds up so precisely that there is no apparent need for the powerful negotiating leverage that price analysis and total price negotiation so often provide.

The fact is that the sum of cost estimates and profit, no matter how carefully drawn and analyzed, may miss being a sound and equitable price by a wide margin. This is shown time after time when competition is introduced into a situation that has been sole-source. An analysis of cost effectiveness and value, either opposing or complementing cost analysis, can lead to substantially lower price objectives than those indicated by a simple addition of the separate cost and contingency elements. The technique of negotiating separate agreement on each cost element, with its forced compartmentalization of contingencies, points in the opposite direction.

e. If the cost is controversial, there is nothing to be gained from trying to get the offeror to agree to exclude some or all of it from the estimate. You are better off if you conserve your energies and arguments to sell your counteroffer on the total package. Your counteroffer obviously will be at a price level that excludes the costs you consider unreasonable or unallowable. The offeror doesn't have to agree to those exclusions, even if it can accept the price. An offeror will frequently concede dollars when it will not concede principles; the total-price technique is designed to make it possible to do so.

Negotiation of multi-item contracts

So far we have talked about a negotiation objective and negotiation of total price in terms of a single, distinct item of work and not total contract price. For instance, in an earlier example in this chapter, we talked about negotiation in terms of the unit and total prices of 100 electrogyros and not 100 gyros plus spare parts, handling equipment, and handbooks. Many negotiations will cover several different items or tasks, each of which will be priced out on the contract schedule. When this is the case, or when you are negotiating the prices of a long list of spare parts, you have to negotiate in such a way that you do not lose sight of the values of the individual items.

To illustrate, assume you are buying end items, spare end items, spare parts, special tools and handling equipment, handbooks and manuals, engineering drawings, and training devices. You get an SF 1411 from the offeror and as many cost breakdowns (contract pricing proposals) as necessary to cover the various items. While you are concerned with what it is going to cost to buy all those items, you must end up with prices for each item identified in the schedule, and each of those prices must be reasonable for the product to which it relates. Costs have meaning in pricing only when they can be related to the effort that causes the costs to be incurred.

This means that unit costs must be the language of analysis, even when other factors make it necessary to negotiate on a total contract rather than an item basis. In this situation, your offers and counteroffers should be the sum of the prices for each of the contract items, and you should insist that the company do it the same way.

Tracking

You write a price negotiation memorandum (PNM) to demonstrate that the negotiated price is fair and reasonable. The PNM takes the reader from the proposal to the negotiation objective and ultimately to the contract price. In doing this, it will show clearly and unmistakably the cost or pricing data used in the process and certified to at the completion of negotiations. This will include both the initial SF 1411 submission and what was submitted later in writing. The transition from one point to the next must be explained; you must show the facts and explain the judgments that moved you from proposal to objective to agreement.

You will have collected a lot of paper by the time you've finished negotiations. You'll have the contract price proposal, supporting schedules, subcontractor cost or pricing data, identification of the source of other data, and revised and supplementary data. The data will have come from the company.

You'll also have reports and work papers from Government personnel who have looked into the company data. Taken together, the two groups of data should tell what data were submitted and which were considered to be factual and a suitable basis for projection.

This won't be the whole story. You also will have to show in the narrative portion of the PNM how you got from facts, to objective, to the price agreed to. This will mean an identification of significant factual data, explanation of how the facts influenced your estimates of future costs, and what factors persuaded you that your number was a good one to use.

You also will have to identify the data you did not use, did not rely on, including any cost or pricing data you found to be inaccurate, incomplete, or noncurrent.

People have said that you can't reconstruct the events of the negotiation to show how the cost or pricing data submitted by the offeror influenced the price negotiated unless you have negotiated on an element-by-element basis, agreeing to specific values for each element of cost.

This is not true if you use the technique of negotiating total price properly and your PNM reports what happened. To illustrate, look at this excerpt from the PNM written by Tammy Watkins, the Government negotiator on the Garsap procurement discussed at the start of this chapter:

	CONTRACTOR'S PROPOSAL	GOVERNMENT OBJECTIVE	NEGOTIATED*
Material	$1,300	$1,200	$1,275
Manufacturing labor	1,125	925	925
Manufacturing overhead	2,025	1,625	1,625
Engineering labor	350	320	350
Engineering overhead	315	270	300
Factory cost	$5,115	$4,340	$4,475
G&A	155	130	135
Total cost	$5,270	$4,470	$4,610
Profit	730	670	690
Unit price	$6,000	$5,140	$5,300*

*Agreement was reached on $5,300 per unit, but not on each element in this column. Derivation of values for the costs will be explained in the narrative portion of this memorandum.

This shows what happened, in summary. The accompanying narrative explains each element in detail, identifying the sources of data for the proposal and showing updated costs that, in the case of material, confirmed the validity of the contractor's estimate except for the $25 by which the estimate exceeded a supplier's firm quote. It shows for labor the actual hours of manufacturing labor expended and indicates the "as of" date for the latest reading of costs. It reports the team's position that a different starting point and steeper slope in the learning curve gave a more realistic estimate of hours and shows how the updated actual hours confirmed the team's original estimate.

Each element of cost was discussed in the negotiations, and Tammy Watkins was able to redefine her real differences with Garsap. As a result, after talking and asserting the merits of her position on each cost element, Watkins concluded she could move from her original ideas, to the extent indicated in the "negotiated" column and explained in the narrative. Accordingly, she made a counteroffer to Garsap and finally reached agreement at a unit price of $5,300.

An orderly negotiation, together with a carefully constructed PNM, will provide a map adequate for anyone seeking to reconstruct the events of the past and to assess the consequences of error, oversight, or willfully misleading actions on the part of the offeror.

Gamesmanship

There are many gambits and ploys available in negotiation. They have names like:

Making the Other Party Appear Unreasonable
Putting the Other Party on the Defensive
Blaming a Third Party
The Sugar-Vinegar Device
Straw Issues
The Walkout
The Recess
The Here It Is Friday Afternoon and You've Got to Catch the Plane Squeeze

Perhaps you are familiar with these tools of the bargaining process, having either used them or having had them used on you. These tactics and other strategems of negotiation are employed regularly (and many times unknowingly) in the process of arriving at mutually satisfactory agreements as buyers and sellers shape their respective positions.

Principles

There are also certain principles that should govern your negotiating practices. These will be mentioned briefly.

Relationships with Contractors

Successful negotiation demands that you establish and maintain sound, cooperative, and mutually respectful relationships with contractors. Merchandise can't be sold in an atmosphere of distrust and deception; neither can your ideas, opinions, and objectives. Successful negotiation depends on your ability to sell yourself and your position; because of this you may need to set the tone for the conference. Any indication of distrust, any flat, unsupported statements that the price is too high, any prolonged questioning in areas that are irrelevant are clearly out of order and will weaken your position and lessen your chances of success. In factfinding and negotiations your review and questions must not degenerate into an effort to prove the offeror wrong.

Individuality

How you actually plan and conduct a negotiation is your choice. There is no one way to do it. As with anything else, you must establish your own style, do what is right for you. You may want to use different approaches with different companies. In most cases you should use different approaches with the same company, particularly if you deal regularly and repetitively with the same people. It is usually a mistake to let your approaches and reactions become predictable.

Basically, this refers to how you dress up your objectives when you make a counteroffer. One negotiator may come in with an offer way below the objective. Another deals in ranges, and any counteroffer will be from the low end of the range. A third may come out flat, after discussions, with a counteroffer that is the same as the objective. There is nothing wrong with any one of these, if it fits, but you may get better results if you use one or both of the others, from time to time.

Policy in Negotiations

DoD procurement policies are rules for you to follow, but they are not necessarily policies and rules that the offeror must live by. The parties to a negotiation may never agree on policies and rules, but they can agree on a mutually satisfactory contract at a mutually satisfactory price.

When DoD policy has a bearing on a position you take, you must know that policy and should know why it exists, the circumstances that led to its formulation, and why it applies to the case at hand. You should be prepared, without necessarily identifying it as a policy, to review in detail the reasons why it makes good sense to apply it. This obviously is intended to put the offeror in position to accept your counteroffer even though it might not accept the policy.

Conversely, you should not throw an unexplained policy on the table as an obstacle in the path of the company. If you operate this way, you can expect the company to respond in kind.

Citing Higher Authority

Indiscriminate use of "It looks good to me, but I can't get my boss to buy it" can lead to confusion and weakening of your negotiating position. You have certain review and approval channels through which you must take your negotiated agreement before it comes out as a contract, but companies know that and have every right to expect you to be able to make a decision and sell it up through whatever channels are required. The prenegotiation review procedure is your insurance and the company's assurance that this can be done. If you abuse the higher-authority citation, the contractor quite properly may try to negotiate directly with that authority.

The point is clear: you are negotiating as a representative of the Government and you are supported by all echelons of the Government. As long as you operate within established policies and procedures, you need not quote anyone. Your comments and positions in negotiations must be yours and not those of someone higher up the ladder.

This is not to say you should not clear all questionable items with higher authority; in some instances, that is what recesses are for. If you are to complete the negotiation effectively and in good time, you must be the authority, as far as the company's negotiator is concerned, and the only contact for negotiating contracts. It may help to remember that the company's negotiator probably has to clear certain matters with management, that the negotiator's authority is limited.

Precedent

Precedent can be an enormously restrictive factor in negotiations, because it frequently establishes patterns that outlive their usefulness. You must be guided by what makes sense for the procurement you are negotiating, and not by patterns you and others may have created on earlier deals. This covers the whole range of treatment of particular costs, of use of the particular rates, of taking certain positions, the works.

Look at each negotiation as if it were the first one you had ever had with the company. Obviously, you don't make new rules each time out, and if it's a pricing action on a contract in being, you don't ignore the understandings and conditions of the agreement on the contract package itself. But you should bring new and current thinking to each negotiation and measure these ideas against precedent so you can come up with better contractual arrangements.

Collaboration

The negotiator should hold a prenegotiation conference with team members. The purpose is to discuss and develop a position on all important aspects and to agree generally on the role each will play during negotiations with the company. Also, from time to time during a negotiation, you can expect team members to reach different conclusions because of varying interpretations of matters discussed.

Forewarn team members to avoid public disagreement, but if controversy arises, get the team together, away from the company's representatives, to consult and give each one the chance to talk. You have the right and obligation of the final decision, but you should accept and use the help specialists offer. There cannot always be full agreement among all team members in the conclusions reached and the counteroffers made, but there should be a minimum of disagreement and no misunderstandings.

It also follows that you should always present the company's representatives with at least the appearance of unanimity. There should be no airing of differences among the Government team when it meets with the offeror.

Don't-but-do

The following list repeats some of the ideas already mentioned and provides some helpful hints and reminders:

a. Don't dictate, negotiate. You represent the Government; be a reasonable person.

b. Don't expose anyone to ridicule or insult.

c. Don't try to make anyone look bad.

d. Don't be predictable in your approach.

e. Do be discriminating. Accept a good offer. Don't feel you always have to knock something off the price.

f. Do fight hard on the important points; win the war, not the battles. Don't start fights you have no chance of winning or which, if you do win, would not be worth the fight.

g. Do remember you usually are in at least as good a negotiating position as the company's representatives. The resources of the Government are extensive, and the diversified experience you gain doing business with many companies can give you what you may lack in depth of knowledge of a single company's situation. The company usually needs your business at least as much as you need its product or service.

h. Do be courteous and considerate. Do what you say you will. Have integrity.

i. Do know when to talk and when to listen. Do stop talking when you've made your point, won your case, reached agreement.

j. Do remember that negotiation is a two-way street and that prenegotiation preparation is the most important attribute of successful buying.

8.6 The Need for Documentation

A contract pricing action must be supported by written evidence that the price is fair and reasonable. This evidence must be detailed enough to reflect the most significant considerations shaping the pricing arrangement.

We are concerned here with the pricing records for all procurements other than those placed by sealed bids. We also are primarily concerned with written communications. As standard practice, requests for information and help in contract pricing should be in writing.

Earlier segments of this manual have covered the elements of contract pricing, from contract type through price, cost, and profit analysis techniques to negotiation of the contract arrangement. We now are looking at the various written communications that support the contract pricing effort and report on the results of the preliminary work. We set up guidelines to follow when you ask for pricing help, report the results of price and cost analyses, describe the development of the negotiation objective, and summarize the results of the negotiation conference.

Reports of analysis and other responses to requests for specific information contribute to the factual basis for deciding that the offered price is fair and reasonable or for setting the price objective if a negotiation conference is necessary. The PNM and any supporting reports of analysis are used in the reviews that precede approval of the proposed contract.

For these reasons, and because of the number of procurements, personnel turnover, and use of contract files in succeeding procurements and in historical and investigational research, these reports and memorandums must permit a rapid reconstruction of all major considerations of the particular pricing effort.

To restate this very important principle: the official contract file must include a written document that demonstrates clearly and conclusively that the price is right. In making this demonstration, the document must show all the significant facts that were considered in reaching agreement with the company. It also must indicate the extent to which the data submitted were not considered or, although considered, were not relied on in reaching agreement.

The document, with its attachments, must identify the cost or pricing data submitted or otherwise acquired and used in the process. It must be complete enough in its narrative to show how the facts influenced your judgments about future costs. It must show how you got from contractor-furnished cost or pricing data, to Government objective, to agreed-to price. It must show the updated costs, new facts, and new interpretations of old facts that persuaded you to move from your negotiation objective, if in fact you did, to the price agreed to.

A pricing communication is intended either to get or to give information. A request for information must be clear, precise, and to the point. The same is true for the response. However, because truisms won't get the job done, we will present standard formats for various pricing communications and give you a few basic do's and don'ts.

The amount of documentation needed depends on the type of action. If the contract award is made after price analysis, the documentation need not be as elaborate and detailed as for an award made after both price and cost analysis. We will cover documentation for price analysis actions first and then take up more involved documentation.

8.7 Documenting Price Analysis

You document in order to show that the contract price is fair and reasonable. You do this by showing the price the contractor offered, the data used to evaluate the offer, and the conclusions reached, and by explaining why the conclusions were sound ones.

The person performing a price analysis prepares a report. This person may be a buyer, a contract negotiator, a contracting officer, a price analyst, or some other individual. The price analysis may give a sufficient basis for deciding that the price is fair and reasonable. However, when price analysis is not enough, cost analysis is needed; the price analysis will include any investigations undertaken to corroborate the findings and conclusions of the cost analysis. Reports of these investigations generally will be incorporated into the PNM.

If an abstract of proposals is required and the facts shown in it demonstrate the presence of competition and the basis for award, there is no need to write a separate pricing report. When a PNM is needed, you must set forth the facts and circumstances that caused you to agree to the price. The recital should be short; how short will depend on the facts, how far you had to go before reaching a decision, and how much self-discipline you have. Two examples of acceptable memos are:

a. "Apex, Inc., quoted a unit price of $275 for 12 MA-1 generators to be delivered two months after contract award. Offers were solicited from four companies. Apex was the only responder. Unit price of $275 is $5 less than the price of 20 MA-1 generators on contract -1234 awarded to Apex 10 months ago. Award of -1234 was made to Apex, the lowest offeror, after analysis of competitive proposals received from three other companies: Acme, Epitome, and Excel. Based on favorable comparison with the competitively established firm fixed price of $280, unit price of $275 is considered fair and reasonable."

b. "Proposals for 15 coolers were solicited from three firms. The abstract of proposals shows the companies and the quoted prices. Ace Distributors quoted a price of $423, manufacturer's list less 10 percent, that was $80 lower than the next lowest offer. Ace's list price in its current catalog is $470, and 10-percent discount is customary in the trade. Award was made to Ace on this basis."

The principle is this: unless it has been made unnecessary by documentation such as a self-explanatory abstract of proposals, you will put in the contract or purchase order file a memo detailed enough to convince the reader that the price is fair and reasonable. It is not enough for you to say, "The proposal was reviewed in detail and I have concluded that the price is fair and reasonable. Janis Jacklin, Buyer." Another unacceptable memorandum is the kind that says, in its entirety, "The price of $50 is fair and reasonable because it is $5 less than the last procurement. Byron Bliss, Buyer."

If a comparison with past prices is the basis for concluding that the price is fair and reasonable, show prices, quantities, sources, contract type, date, production or delivery schedules (if known), and reasons why the previous prices are good standards for comparison.

If reasonableness of price is established by comparison with a catalog price and discount schedule, state the facts and show the catalog price if it is different from the offer. The same rule applies when an item (brand name or competing products of a similar nature) is available from several sources. State the market price or market price range if it is different from the offer. If reasonableness is established by comparison with a Government estimate, state this fact, list the estimated figure, and tell why the estimate is a valid basis for comparison.

If reasonableness is established, ultimately, by telephone or face-to-face negotiations with the offeror(s), describe the offer(s), your objective, and the negotiated price and summarize the principal reasons for reaching agreement on the price and making the award. If it is necessary to award at the offered price, even though you are not completely satisfied with it, describe the efforts you made to establish another basis for award and the reasons why they didn't work.

8.8 Documenting Larger Procurements

For the rest of this chapter, we will look most closely at situations where the dollars and the nature of the procurement are such that pricing assistance is obtained from outside the procurement activity. We assume that in these situations cost analysis will be necessary and that price analysis input from the field will be limited. We also assume that the decision about who will write a particular kind of report will be based on direction and guidance in standard operating procedures (SOPs) or in other parts of this manual.

Roles of team members

We can summarize the roles this way:

a. The contracting officer, in the RFP, asks offerors to use SFs 1411 to submit proposals and supporting cost or pricing data. An offeror is the primary source for its cost or pricing data, and the data are as much a part of the proposal as the price, delivery schedules, and other terms and conditions. These data include both prime and subcontractor data.

b. The contracting officer requests technical and field pricing assistance, but a contract price analyst in the procurement organization may make the request in the contracting officer's name. If there is no price analyst, the requestor may be the negotiator or the buyer. Requests for specialized pricing assistance come from the person responsible for the price decision or from someone designated by that person.

c. The ACO, or a price analyst in contract administration, requests cost analyses from the auditor and other specialists. The requests will be for information that either the PCO or the ACO, when functioning as a PCO, needs. The ACO or the designated price analyst collects and consolidates the several reports, adding comments and analyses as needed, and forwards them to the PCO. If the negotiation will be done by the ACO, the separate reports of analysis will be used to develop a negotiation objective.

d. The auditor prepares a report after reviewing the facts and evaluating the projections of future costs. This is done by reviewing the contractor's books and records. The auditor reports on any other facts that may have a significant bearing on the proposed price. The auditor is not limited to those data submitted or identified in writing by the offeror. The auditor may comment on cost or pricing data not submitted by the offeror that may have a significant effect on the proposed contract price. Further, if the cost or pricing data submitted are not accurate, current, or complete, the auditor sets the information out in the audit report.

e. Technical reports are written by specialists working in contract administration, when asked by the contracting officer. They report findings that result from applying their special knowledge to elements of the proposal. The auditor includes any financial effect of these findings in the report. Any differences between technical and audit analyses, such as projections of direct labor hours using learning curves, are presented to the contracting officer.

f. A PNM is written by the contracting officer, or more likely, by another person named to do it. Again, depending upon the organization, this may be the price analyst, negotiator, or buyer. In any event, it is an individual who actively participated in negotiating the pricing arrangement.

There are two major types of pricing reports: those written before negotiations and those written after. The ensuing discussion of report formats makes specific suggestions about what kind of comments and information to include in what parts of the reports. In this we are not always consistent and complete. For example, the content of a PNM for the final settlement of an incentive contract would be different from the PNM for the initial negotiation of the same contract. We have not always made that distinction in discussing the content; to do so would result in considerable repetition to no real advantage.

We say no real advantage because the principal variable is the amount of actual cost data available in the different pricing situations. The existence of actual costs of the contract being negotiated or from preceding contracts has a distinct bearing on the way the analysis is made and the way negotiations are conducted. The auditor's report tells what was done and how the available cost experience was used. The other cost analysis reports do the same.

The PNM summarizes the actual negotiation proceedings; if actual costs were available, they would have been a factor in analysis and would have helped shape the objective. As a consequence, actual costs will be reported in the PNM. Despite this general disclaimer, we do provide suggestions about the proper place for particularly meaningful comparisons of actual and estimated costs, or of incurred-to-date and total estimated costs.

Requests for proposals (RFPs)

RFPs will specify the kind and extent of pricing information the offeror must submit to support its proposal. To make sure this gets done and done right, a contract price analyst should be in the act early in the planning stage to help with this part of the RFP. The RFP should tell the offeror to use the SF 1411 and to return a complete package so that you won't have to ask repeatedly for data or spend a lot of time digging out the necessary factual information.

If you have repeated negotiations with a company, you probably should work out an agreement with the company on the detail it will furnish with its proposals. The level of detail can be tailored even more if Government people are assigned to the plant. The resident people can help by pointing out potential problems and the specific information that should be requested.

Requests for information and assistance

Request pricing assistance as soon as possible in the procurement cycle. If the procurement has been programmed and constitutes an important part of your organization's total workload, you may want to line up the necessary field pricing support for both prime and subcontract proposals before the RFP is prepared. Required data can be anticipated and requested in the RFP so the necessary work can be scheduled on an orderly basis. In other instances, generally on smaller, more routine procurements, requests for field assistance can wait until you have received the proposal and are satisfied that the proposal is complete and requires field review.

Requests for assistance must be specific about the areas to be evaluated, the type of information wanted, and the time available for the analysis. Give the field as much time as you can. If you are particularly concerned with the estimated material cost, you might ask for an analysis limited to the cost of material. For example, your request might read like this:

"Material accounts for about half the total estimate. I need to know how that estimate was developed. Are the quantities realistic? How do scrap and obsolescence factors compare with the company's recent experience? What are the trends? How is material priced? How current are the prices that are used? How are sources selected?"

At the same time, you might ask a different specialist for some other information, and that request might read like this:

"We've asked for an analysis of the quantities and prices of the material estimate. We sent you a copy of that request. In addition, we need your help on yield. What is the ratio of number of units put into production to the number of acceptable finished units coming out? Is this an acceptable yield for this product? Is the company doing anything to get and keep the rate within acceptable limits? Is the estimated yield within this figure? Please include any other specifics dealing with material such as kinds and quantities of material, particular problems in machining and assembling parts and components, and quality and delivery problems with suppliers. Negotiations are tentatively set for the 25th, which is three weeks from this Tuesday. We need your answers by the 19th."

The rule is to be as specific as possible when requesting information and assistance. To do this, you must know something about the product or service being procured and its cost. You also limit the area of review as much as possible to expedite the response. However, you can only tell the specialist what it is that bothers you, what questions you want answered, and when you need it. How he comes up with the answers is his speciality.

You are interested, of course, but only to the extent that the report must convince you that the specialist has done enough to ensure reliable answers, explored all reasonable avenues, and has not overlooked any significant factors. You should never go out with a general "Give me an analysis of this proposal" request unless you know nothing about the company or the problems that you may encounter in analysis and negotiation.

To restate: Be as specific as possible about what you want done; limit the area of analysis whenever possible; set a due date for the reply; and recognize that while you can prescribe what you want, you cannot limit the scope of review. Many proposals do not need complete analysis. Recent negotiations with the same company may have established a basis for negotiation of the current proposal. You may need only the latest, most current information on direct costs, with only limited verification of labor and indirect cost rates.

Requests for analysis of particular cost elements by engineers, packaging technicians, inspectors, and others also must be specific. Conservation of their time is one, but not necessarily the most important, reason. The more specific the request, the more responsive will be the answer. It is not enough to get an answer in the jargon of the specialist; you must be able to understand and use it.

Another basic ground rule is that you buy hardware and services, not costs, and it is the ultimate cost you are concerned with. Your objective in requesting pricing support is to have a factual basis for determining the value of what you're buying. If we lose sight of this objective it is easy to find ourselves caught up in the tangle of parochial quarrels over specific costs.

Recommendations

When you are responsible for reaching an agreement with the company on a pricing arrangement, you go to others (auditor, ACO, engineer) for advice and assistance. You use what you get from them in making your decision about the proposed price and, if a negotiation conference is to follow, in developing the negotiation objective.

For this reason, you will not ask the ACO (and through the ACO, any of the field specialists) or any other persons outside your procurement office to give you a recommendation on the fairness and reasonableness of the contract as a whole or on total costs, proposed prices, or profit weights and rates. In asking for a recommendation you are asking someone else to make your decision for you, something that person may be in no position to do and something you should not delegate.

You go to these people for the facts on which to base your decision and not for the decision itself. Generally, you will know more about the overall situation and be in a better position to make these decisions. You are looking for facts and informed opinions based on facts, and you are asking the specialists for information on matters within their areas of special competence. You should not ask them to give you a negotiation objective, which is what a price recommendation at this point would amount to.

Examples will help explain what we are saying about recommendations. The field pricing package the ACO sends in should have summary conclusions like the following:

a. "A unit learning curve computer program was used to analyze the historical lot average hours. The program performs a least squares, log-log transformed linear regression to the weighted lot data points. (The data points are shown in the attached printout.) The results of the analysis indicate a slope of 83.5 percent, a T^1 of 25,892 hours, and a coefficient of determination (R^2) of .94. Projections for the proposed production units indicate that the average unit hours will be 8500 hours per unit (see attached printout). Because the proposed units are follow-on production at approximately the same rate, this projection appears to be realistic and reasonably attainable."

b. "Considering the foregoing findings about the bill of materials' prices, and correcting for the overstatement of quantity requirements, the material cost of producing this equipment should be within plus or minus 2 percent of $760 per unit."

c. "The rate of 215 percent results from the suggested deletion of $358,250 from the overhead expense pool and the addition of $210,000 to the labor base. It is realistic for the period of contract performance."

What you don't want is something like this.

"Based on the foregoing, the price of $9,735 per unit is fair and reasonable and recommended for your use."

There is one other rule. You should evaluate the quality of the pricing assistance you receive. Whether the reports are good or bad, you should give the sender your verdict and support it with specifics. Otherwise, the sender may operate with no sure knowledge of whether he has satisfied your needs and may assume, in the absence of evidence to the contrary, that he is doing a good job.

Unless departmental procedures require written prenegotiation clearance, written records before negotiations generally will be restricted to field pricing reports from the auditor and the ACO. Separate written price analysis reports, as distinguished from cost reports, may be in order when cost analysis is not needed and the reasonableness of the price can be established without negotiation.

Cost analysis reports, together with the offeror's cost or pricing data, are the other records used to form a prenegotiation objective. These are advisory reports, the means by which the person who made the analysis tells you what he found. What you do with this information is your business and your responsibility. The advisory reports should identify what was analyzed, what factual data (not already identified by the offeror in its contract pricing proposal) were used in the analysis, what conclusions were reached, and what reasons support the conclusions.

Ordinarily, conclusions must be expressed in terms of dollars or percentages if they are to be useful. An analyst who concludes that the offeror has overestimated the labor hours needed to do the job can't stop there. The advisory report also must say what estimated hours should be and why.

You may have sensed that we're still skirting the question of whether or not the report should make a recommendation. What makes us so skittish is the people problem. If the PCO, ACO, contract price analyst, and auditor are all qualified, know and talk to each other, respect each other's abilities, and make allowances for any biases or blind spots, we really don't care how they split the job or what they say to each other. However, in the absence of these qualities, we must delineate the tasks as they are normally divided and include the prohibition that the reporter will not, unless specifically requested, make recommendations on subsequent actions or decisions.

Only when the price analyst at the procuring activity is unable to participate in the negotiation and, as a consequence, is unable to write or help write the PNM, will he need to write an analysis report before negotiations take place. If the price analyst cannot participate, the report will help the team develop its objectives and negotiate with the company.

If preliminary analysis leads to the conclusion that the offer is fair and reasonable and there is no need to hold a negotiation conference, a report will be needed. It will summarize the actions taken and give the reasons why it is sound to award without further discussion. These instances occur infrequently. Departmental procedures may require this type of report as a clearance request before authorizing completion of the contract action.

Even though you must develop an objective before entering the negotiation stage with the company, you don't need to write up the objective in a separate report unless this is required by departmental contract clearance procedures. If the negotiation objective was cleared with management using charts or transparencies, copies of the presentation will be adequate documentation. If it was cleared informally, the PNM should indicate the level of clearance.

Reporting cost analyses

The following are minimum standards to be met when reporting the results of a cost analysis. The report will include the indicated information to the extent it is available and relevant to the particular pricing action. The auditor's report always will include a review of the influence of the contractor's actual costs on the estimate/proposal. The cost analysis report also should identify the cost or pricing data reviewed.

Identification is not the chore it seems; the offeror will have completed an SF 1411 and submitted or otherwise identified much of the cost or pricing data required. The cost analysis report will identify only those additional or updated elements of data submitted in writing or otherwise acquired during the process of review.

Obviously, not all analyses will require the same detail or emphasis; length and detail will vary with the situation. The following format will be followed:

a. *What was analyzed.* Identify the company, the purchase request, the RFP or contract number, the product or service involved, the price or prices proposed, and the specific areas analyzed. If the complete proposal was analyzed, make a summary comparison of the proposal with the results of the analysis, broken down by major elements and presented in tabular form.

b. *How it was analyzed.* Show the date that the company prepared the cost estimate. Indicate, by name and title, the Government contributors to the analysis and the company personnel contacted. Describe supplies and services. Indicate delivery schedule and past delivery performance for the same or similar item. State the extent to which Government facilities will be used and whether additional facilities are required or contemplated. (If the analysis covers additional work under an existing contract, or interim or final repricing, indicate the extent of Government facilities actually used.) If a significant amount of leased plant or equipment is involved, discuss the need for the lease and the reasonableness of the terms.

In discussing particular cost elements, show how the costs were estimated. Cite current estimating methods reviews. Any time actual costs are available and relevant, show the relationships between experience and the trend projection. Clearly indicate the *as of* dates of the actuals. Direct costs of materials and labor and the amounts for special tooling and test equipment usually get close scrutiny during analysis.

Put the results in this part of the report and show how these costs were analyzed. Indicate any assumptions made by the company about prices, rates, quantities, manufacturing processes, type of tooling, rate of production, overtime, and other basic factors in the operations. Show nonrecurring and recurring costs separately, if they are relevant and identifiable.

If you used a computer to analyze data, briefly describe the program in your report. If it is well known, the name of the program may be enough; if it is not, a description probably will be necessary. A copy of the printout, including the data used, should be attached to the report. You don't have to repeat the information in the report if it is in the printout. However, between what you put in the report and what is in the printout, the recipient must be able to get the full story of what you did, what you used, and the results.

If subcontracting has been given special attention, state the basis for the estimate, the relationship of estimates to the current orders, and, if a subcontract is placed, the type of contract. If the contract type is an incentive with target and ceiling, indicate which figure was used to price the subcontract amount. Comment on the adequacy of the company's procurement procedures, stating whether the purchase methods have been reviewed and whether acknowledged weaknesses have been corrected.

Include profit in the report as a specific subject only if comments on individual costs and performance factors have not disclosed relevant information useful in assigning weights. However, the determination of weight ranges and profit dollars is the PCO's responsibility. Recommend specific weight ranges and profit dollars only in the most unusual circumstances. Analysis of facts bearing on profit factors should be reported to the PCO as a matter of course; rate recommendations should be included only upon request.

c. *Conclusions*. Conclusions will be supported by the findings of fact already reported. If there are differences in the interpretation of the data, as, for example, between the auditor and the production specialist on the need for certain types of tooling, you may acknowledge this so the PCO can know that controversy exists about the significance of certain facts.

Conclusions are not recommendations, but they may include suggestions for items and assumptions to be discussed further with the company's negotiators. They will show the relative significance of some of the reported facts and why the negotiator might need to pursue these matters in negotiations.

State why some costs are good and how much significance can be attached to the costs, particularly when projecting future events. In other words, do not concentrate on costs questioned or set aside for the contracting officer's consideration, thus blessing by inference, if not fact, the rest of the estimate.

Reports after negotiation

The PNM is the only document required after negotiations have been concluded. Its purpose is obvious. It tells the reader the story of the negotiation. What was the offer and what were the costs in the SF 1411 package? What was the Government's price objective and what were the costs supporting that goal? What cost or pricing data were submitted but not relied on and not used? What were the goals as to delivery and pricing arrangement? What was discussed? What were the compelling arguments? What disposition was made of the principal points raised in preliminary analyses, included in the objective, and discussed in the negotiations? What values, cost and other, support the agreed-to price? If these are different from those supporting the objective, what justifications are there for the difference?

The PNM is, first, a sales document that establishes the reasonableness of the agreement you have reached with the company. Second, it is the permanent record of your decision. It charts the progress from proposal through negotiations and does so in specifics.

The PNM will be the source document if it becomes necessary to reconstruct the events of the procurement. You may not be around to help, so you must leave tracks that strangers can follow. In addition to proving that the price is fair and reasonable, the PNM must identify data not relied on. It must convince the reader that you did all that needed to be and could be done to reach a fair and reasonable price.

The question of length is critical, because it is very easy to go into excessive detail in reporting the events of an extended negotiation. You must guard against this and, perhaps just as importantly, against using the jargon of the specialists involved.

This advice is somewhat fatuous, however, because ultimately you will find yourself writing for the most important of your probable readers: the individual or group that has the final say on whether the contract is approved. This will dictate the detail of your PNM and, to some extent, its style. All we can do here is to ask you and your bosses to be reasonable and strike the balance between too few words and too many.

We will provide the format to follow: subject, introductory summary, particulars, procurement situation, negotiation summary, and miscellaneous. While the format is standard, the content must vary to report the actual events of the analysis and negotiation. What events will be reported depends on whether the negotiation is to agree on the terms of a definitive contract, a definitive contract superseding a letter contract, a firm-up of an FPIS contract, new work to be added or changes to an existing contract, or the final settlement of an incentive arrangement.

The principal cause of differences among PNMs, in addition to the dollars at stake, may be the amount of actual cost and performance data available and relevant to the negotiation. The availability of the data will shape the course of analysis and tell you the kind and amounts of information to include in the PNM.

You might be right if you assumed that the more data there are, the longer the PNM, but we're not sure this relationship exists. In fact, if we were betting, we would go the other way; the existence of meaningful actual costs should make it possible to be quite precise in explaining what was done and why it made good sense to do it.

The PNM format is explained in the following subparagraphs.

a. *Subject.* This is a memorandum for many readers with different purposes, so the subject should be fairly complete. Don't address it to any particular individual or office. The subject, together with the introductory summary (the first segment of the PNM), should give the reader a complete picture of the negotiation. For example, the subject might be:

PRICE NEGOTIATION MEMORANDUM

Garsap Corporation
Dover, Oklahoma
Contract XX XXXXXXXX,
Production of M-2 Electrogyros
FY XX Funds, Case File #3145

b. *Introductory summary.* This will be the first segment of the PNM. Show the type of contract and the type of negotiation action involved, together with a comparison of the company's proposal, the Government's negotiation objective, and the negotiated results. Identify specifically the contract items included in the total figure shown as the negotiated amount. In one case you might note that items 1 through 4 are included in the total figure but are identified separately later in the PNM. In another instance a detailed item breakout might be included in the introductory summary. No matter how you do this, the information should be shown on one page. For example:

> "This is the first buy of 100 each M-2 electrogyros. There was no letter contract. Negotiations were completed 16 September 19X2 with Garsap, the designer and sole manufacturer of the M-2 gyro. The Garsap proposal, the Government objective and the negotiated agreement for the total 100 gyros are compared below. Each figure is predicated on the contract being FFP.

	PROPOSED	OBJCTIVE	NEGOTIATED*
Estimated cost	$527,000	$447,000	$477,000
Estimated profit	73,000	67,000	70,000
Total price	$600,000	$514,000	$547,000
Profit rate, percent	14	15	14.7

*Figure of $547,000 was negotiated for an FFP contract. The breakout of cost and profit represents adjustments made by the Government negotiators to their objective and was not agreed to by the company. No attempt was made to get agreement."

A more involved example is:

"Negotiations to definitize subject letter contract as an FPIF arrangement were completed 9 July 19X2. The total incentive package, comparing the proposal, our objective, and the negotiated arrangement, is as follows:

	PROPOSED	OBJCTIVE	NEGOTIATED*
Target cost	$3,122,521	$2,865,000	$2,950,000
Target profit	468,380	272,200	265,500
Target price	$3,590,901	$3,137,200	$3,215,500
Profit, percent	15	9.5	9
Contract type	FPIF	FPIF	FPIF
Share:			
Over	95/5	50/50	60/40
Under	70/30	50/50	80/20
Ceiling	$4,059,277	$3,409,350	$3,422,000

Attachment 1 to this memo shows the negotiated arrangement in graphic form."

If the negotiation is the final settlement of an incentive arrangement, the initial and adjusted targets and the ceiling should be shown here. Reasons for the adjustments will be explained in the segments on the procurement situation and appropriate paragraphs of the negotiation summary.

You must make this first segment into what its title says it is: an introductory summary. The ideas exemplified above must be a part of each PNM. Complete uniformity on the opening page accomplishes many things for many people, including making comparable data from all buying activities readily available. The proposed, objective, and negotiated figures shown must be truly comparable figures representing the same elements of work. If the scope has changed, suitable adjustments should be made. These changes should be explained later in the memorandum.

c. *Particulars*. The purpose of this second segment is to cover the following without duplicating any information that was included in the Subject.

1. Contract or purchase request number, including supplemental agreement number if appropriate.

2. Complete name and location of company.

3. Quantities.

4. Unit prices quoted and negotiated. If many, attach as a schedule.

5. Dates and places of factfinding, prenegotiation review, and negotiation.

6. Names and titles of participants in prenegotiation review.

7. Names and titles of company and Government personnel in attendance, identifying the principal negotiators.

d. *Procurement situation*. This is the third segment. In describing the procurement situation, include any outside influences and time pressures. Show the delivery schedule or period of performance. If there is a difference between the schedule desired or required and that proposed by the company, discuss the resolution or compromise, if any. If the pricing is prospective, state the type of contract contemplated in the RFP.

List any previous buys of the same or similar items. Include when, how many, schedule, unit or total price, production rate, and other similar features. If the prices of previous buys were adjusted in accordance with redetermination or incentive clauses, show both target and final prices. You need list only the most recent or most relevant of such prior procurements.

Discuss the factors influencing source selection and any facilities furnished the company as a result of this buy, together with an indication of the percentage of the Government's share in the total investment. Reference to facilities furnished in terms of total dollars ordinarily will be enough. Discuss any unique features of the procurement.

If the negotiation is to firm up an FPIS arrangement or to convert a letter contract to a definitive instrument, indicate how much of the contract task is completed. In the final settlement of an incentive arrangement, any changes from the initial contract quantities or schedules will be explained here.

e. *Negotiation summary*. This fourth segment will show the company's contract pricing proposal, the Government's negotiation objective, and the negotiation results tabulated in parallel form and broken down by major elements of cost and profit. Whether these will be summary figures for total contract value, summary for the total price of the major item, unit price for the major item, or some other presentation will depend on how negotiations were conducted. The general rule is to portray the negotiation as it actually took place. Unit cost and profit figures may not give the true picture of the significance of each element; you should show total as well as unit values in the narrative that follows.

If, to price out a multiple line item procurement, you have developed a computer model that provides both unit and total prices, all you have to do is attach the detailed printout of the unit price breakdown.

A parallel tabulation gives a quick comparison of events, but it obviously can mislead and so needs explanation in the narrative portion of the PNM. Besides, we can now hear the cry, "We negotiated price; we didn't agree on separate elements of cost and profit. How can I show what I didn't do and don't know?"

True, you did not agree with the offeror on values for purchased parts, subcontracts, other material, engineering, model shop, tooling, fabrication and assembly labor, and so forth. However, if you used cost analysis, you talked about those costs and others. The offer was supported by estimates of those costs. Government analyses were concerned with them -- your objective gave them values. You had reasons, both factual and judgmental, for the values in your objective, and you tested again the validity of those reasons.

Besides, in the interval between offer and negotiations, both facts and judgments probably changed, because later data were pumped into the system. Because of this, interpretations changed too. As you negotiated, your ideas about some of those values in your objective changed and, with that, your objective also changed. When you finally shake hands, you should know what you think the costs are going to be; these are the numbers you put in the *Negotiated* column.

It is important that you identify, and in so doing, tie the knot on the thread that traces costs, relied on and not, from proposal through analysis, updating, and negotiation to their influence on the price finally reached.

Discuss in succeeding paragraphs the treatment of each of the major elements in the company's proposal. Devote separate paragraphs to the major cost categories of the breakdown. Start the discussion of each cost with a comparison of the amounts in the proposal, the objective, and the estimate supporting the price agreed to. The narrative will consist of a paragraph describing the basis of the contractor's estimate, another paragraph discussing the basis of the Government's negotiation objective, and a paragraph discussing the results of the negotiations.

Make these paragraphs as precise as possible in identifying factual data, their sources, and their currency. Where seemingly significant cost or pricing data submitted by the contractor were not relied on or not used, identify them here. The reasoning supporting the objective and any significant departures from it in moving toward agreement on price should establish, with little room for question, which data were used and which were not relied on.

If the negotiation is to definitize a letter contract, firm up unpriced orders, or otherwise agree to prices that are based in part on work that was authorized and started earlier, show the trends of the data, segregate recurring and nonrecurring costs, indicate percentage of physical completion of the contract, show actual costs incurred from inception to date, and, if significant, show the contractor's current estimate to complete.

If the negotiation is to establish the final price of an incentive arrangement, make two comparisons. First, compare the contractor's statement of actual costs incurred with acceptable actuals. Acceptable actuals are those that are reasonable, allowable, and allocable. Explain differences. Second, compare the initially estimated costs, adjusted where possible for changes, with the final acceptable contract costs. Where differences are significant, identify the causes, if possible.

These separate discussions should establish the reasonableness of the Government negotiation objective and the price negotiated. The PNM will tell how reports of cost analysis and price analysis were used and show how the principal findings in each were reconciled or otherwise taken care of in the agreement finally made.

When there are significant differences between the negotiation objective and the comments and conclusions of these advisory reports, you should supply the answers to the questions you know will be asked. The same goes for significant departures from your prenegotiation position regarding any element of the supporting price proposal.

Contracts that used certified cost or pricing data contain clauses that provide for possible adjustment if the data are later shown to have been defective. The clauses provide that the contracting officer will determine whether the price agreed upon was increased by reason of the defect. While negotiations are conducted to reach agreement on fair and reasonable prices, and every effort must be directed to that end, memorandums must be written to permit that determination, should the facts make one necessary.

For example, assume you relied upon a current overhead rate of 350 percent and negotiated a price with the contractor after resolving many judgmental factors, but, through it all, you believed that the certified current overhead rate was 350 percent. You subsequently discover that the rate does not reflect an increase in the base during the month before the negotiation meeting, and that the increased base is expected to continue for the life of your contract. You relied on inaccurate data, and your future decision to adjust the price, if a significant sum is involved, will be easy if your memorandum clearly spells out the reliance on the 350-percent rate.

On the other hand, suppose you decided in the negotiation that this company's overhead was hopelessly out of line. This conclusion is based on your knowledge of other companies and on advice from the ACO and the auditor. You probably will tell the company about this conclusion and you will undoubtedly get a reaction, either a counterargument or some recognition of the validity of your position, or both.

You may go ahead and ultimately negotiate a price that reflects the company's acceptance of your position, or you may use a rate of 325 percent in developing your objective, without an indication of acceptance by the company, and still get its agreement on a total price that is close to your objective. Your memorandum will show that you did not rely on the submitted cost or pricing data. A defect disclosed later would probably not warrant any adjustment in price.

Remember that the contractor's judgment is not involved, but the facts supporting the judgment are. If your judgment rests on these facts and they are defective, you will consider adjusting the price. If the total price was based on only a part of the data, you must identify the part that you did not rely upon and furnish your rationale for the solution you adopted.

You must delineate the basis for the price negotiated in such a way that the data not relied on can be identified, so future discovery of defective cost or pricing data can be evaluated and the amount of any necessary price adjustment fixed. It is equally important to be able to show that no price adjustment is indicated, if such is the case.

For prospective price negotiations, estimated profit is an integral part of the negotiation objective. The development of the profit objective for those negotiations should be discussed in this part of the PNM.

In most cases the weighted guidelines method will have been used. When it has, you should use DD Form 1547, Weighted Guidelines Profit/Fee Objective, filling in the spaces for the cost objective and profit weights. The form should be appended to the PNM. The rationale supporting assigned weightings should be detailed in the body of the memorandum. Even when weighted guidelines are not used, the PNM should include, in similar detail, the system used to develop the profit objective and the weights used.

After this detail, the narrative must justify and explain the selection of contract type and the specific pricing arrangement agreed to. As to contract type, where the selection is obvious, as with a repeat buy of an item bought in quantity many times, little or nothing need be said.

When incentive arrangements are used, explain fully the incentive parameters and how they were developed. If you negotiate a CPIF (cost incentive only) arrangement, explain the range of incentive effectiveness and how you arrived at the cost-sharing arrangement. You can do this in a short paragraph explaining where and why actual costs may vary from target and assessing the probabilities that there will be significant variances. For FPIF arrangements, explain the considerations involved in establishing sharing arrangements and price ceilings. If costs have already been incurred, explain how they were considered in setting the contractual arrangement.

When multiple incentives are used, you must give particular attention to the interrelationships of the various segments of the incentives. This includes, in addition to the reasons why incentives were placed on particular performance characteristics, a brief discussion of trade-off possibilities between cost, performance, and time.

Cost/profit charts showing the relationships between cost and profit on straight cost incentive arrangements, and between the cost and other incentives on multiple incentive arrangements, should be attached to the PNM. If you used a computer in structuring the incentives, attach copies of trade-off curves and tables.

In the final paragraphs, summarize the reasons the agreed price is fair and reasonable. When, in order to reach agreement, you have made an additional concession in price without changing your ideas about cost, the circumstances must be explained. If the arrangement offers an incentive, and you have traded cost for profit, explain the mathematics of the trade-off.

In the highly unusual case where you consider that the most likely final price will be significantly higher or lower than the negotiated targets or price, discuss this probability openly and document it fully for use in planning, programming, budgeting, and later analysis. In every case remember that the purpose of this summary is to demonstrate the reasonableness of the price negotiated and not to explain negotiated reductions from the company's proposal.

f. *Miscellaneous*. Reference to and remarks regarding such things as audit reports and ACO analyses should go here.

Distribution of PNM

Whenever cost or pricing data are used, send copies of the PNM to the auditor and to the ACO, even if their services were neither requested nor used.

Suggested Readings

Written or Oral Discussions and Competitive Range

FAR	15.605	Evaluation factors
	15.608	Proposal evaluation
DFARS	15.608	Proposed Evaluation
FAR	15.609	Competitive range
	15.610	Written or oral discussion

Price Negotiation Defined

FAR	15.803	General

Principles and Techniques

FAR	15.805-5	Field pricing support
DFARS	15.805-5	Field Pricing Support
FAR	15.807	Prenegotiation objectives
DFARS	15.807	Prenegotiation Objectives

Negotiation

Give and Take: The Complete Guide to Negotiating Strategies and Tactics. Karrass, Chester L.; New York, Thomas Y. Crowell Company, 1974.

The Need for Documentation

FAR	15.808	Price negotiation memorandum
DFARS	15.808	Price Negotiation Memorandum

CHAPTER 9
Special Pricing
Tasks

CHAPTER 9

SPECIAL PRICING TASKS

CONTENTS

9.1 Catalog or Market Price Exemption 9- 2
  Exemption 9- 3
  Market price. 9- 6
  Prices set by law or regulation 9- 7
  Use of SF 1412 . . . . . 9- 8
  Verification 9- 8
  Logic chart 9- 9

9.2 Spare Parts 9-11
  Fair and reasonable spare parts prices 9-12
  Unit price integrity 9-12
  The contractor's system of pricing. 9-14
  Formula pricing 9-15
  Special catalogs 9-20
  Contractor's catalog 9-22
  Evaluation of costs and prices 9-23
  Preservation packaging and packing 9-24
  Cost or pricing data 9-25

9.3 Warranties 9-25

9.4 Pricing Procurements for Foreign Military Sales 9-26
  Typical problems 9-27
  Pricing by cost analysis 9-27
  Recovery of nonrecurring costs. 9-28
  Country-to-country agreements 9-29

9.5 Pricing Data Items on the DD Form 1423 9-29
  Definitions 9-29
  Objectives 9-30
  Pricing method. 9-30
  Price groups 9-31
  Analysis 9-32
  Examples. 9-33

Earlier chapters have dealt with contract pricing without attempting to identify situations that require special action. Some of these situations are identified and discussed in this chapter.

The requirement to furnish cost or pricing data and certify to their accuracy, completeness, and currency does not apply when the prices quoted are, or are based on, established catalog or market prices of commercial items sold in substantial quantities to the general public, or are prices that have been set by law or regulation. This potential for exemption from one requirement imposes another, however. The contracting officer must get information from the contractor to help decide that the item qualifies for exemption.

Section 9.1 explains how the SF 1412 is used to determine if the exemption applies in the particular case. It explains the form and what to get in the way of supporting data. It points out that after deciding the exemption applies, the contracting officer still must find the price to be fair and reasonable. The section concludes with a logic chart that summarizes the whole discussion.

Section 9.2 talks about how to price spare parts. It points out that most of the techniques discussed in the earlier parts of the manual will be used in analyzing spare parts prices. It then examines the factors that are unique to spare parts procurements:

a. The need to analyze and negotiate so that spare parts line item prices have integrity.

b. The need to rely on the contractor's system of pricing.

c. Formula pricing.

d. Government catalogs.

Section 9.3 covers the special considerations present in pricing procurements for foreign military sales. Most of the special features stem from the fact that the market is different and DoD is buying for someone else's use. The section outlines four special considerations and illustrates four common problems. It then talks about how to price by cost analysis and discusses the special treatment of nonrecurring costs. Finally, it cites the need to conform to existing country-to-country agreements.

Section 9.4 covers the pricing of data items on the DD Form 1423. It explains the "over and above" concept that is used to price data, defines terms, and states the method of data pricing. It then explains the use of price groups and concludes with examples.

9.1 Catalog or Market Price Exemption

This section discusses the special circumstances that surround the pricing of items when the offeror declares that the prices quoted are catalog or market prices, are based on catalog or market prices, or have been set by law or regulation. We discuss why these items are given different treatment in analyzing and negotiating prices and why, when the assertions have been validated, price analysis techniques are adequate.

We describe the use of the SF 1412 to claim exemption from the requirement to furnish cost or pricing data and to submit evidence of either the commercial nature of the item or the assertion that its price is set by law or regulation. We point out that the exemption from cost analysis does not necessarily mean the price is reasonable. We point out some difficult aspects, such as how to determine that sales to the general public have been substantial and how to deal with product line prices and "based on" prices.

Federal procurement statutes presume that when there are many buyers and many sellers, the workings of the marketplace produce fair and reasonable prices for the products and services exchanged in that market. If a seller is able to find buyers, and if the buyers have other choices open to them, the resulting prices are presumed to have been set by competition.

However, if there is no competition, if offered prices have not been set in the marketplace or by law or regulation, and if at least $100,000 is involved, the offeror is required to submit, with its proposal, the cost or pricing data used to develop the proposal, and later to certify that the data submitted or identified to the buyer were accurate, complete, and current.

The buyer has options in pricing contracts. When able to buy at prices established in a marketplace, or at prices based on other prices that were set competitively, the buyer can use price analysis techniques to determine the reasonableness of price. The facts gathered to determine what was sold, to whom, in what quantities, when, and at what prices will be the facts upon which to judge the price. If analysis of the facts convinces the buyer that the prices are reasonable, there is no need for cost or pricing data and cost analysis; the interaction of buyers and sellers in the marketplace will have done the job.

Exemption

The SF 1412 is used to support a claim for exemption from the requirement to furnish cost or pricing data.

If the offeror claims its price is, or is based on, an established catalog price, the offeror must identify the catalog and the quantities of the item sold to the U.S. Government, sold at catalog prices to the general public, and sold to the general public at other than catalog prices. For items in the last two categories, the offeror must provide sales information on three sales, indicating category, date, number of units sold, and unit prices for each.

If the offeror claims market prices as the basis for exemption, it must show the source and date or period of the market quotation or other base for market price, the base amount, and applicable discounts. If the offeror claims law or regulation as the basis for exemption, it must identify the law or regulation and attach a copy of the controlling document.

Catalog Price

The offeror should identify the catalog on the face of the form and attach a copy of or extract from the catalog. A company that has repetitive business with a buying office may provide a copy of its catalog, keep it current, and reference it on the SF 1412. A firm that deals with several buying offices may make arrangements with its ACO to keep or have available a catalog and to clear all actions through the ACO.

You can decide which method to follow. Your aim should be to cooperate with the ACO and to pick whichever method will keep the paper flow to a minimum. You can waive the requirement for submission of the 1412 if you find the ACO or another buyer has made a positive determination on the same item or similar items within the past year.

Similarly, you can dispense with the requirement for the form or limit the data required to be submitted if you are satisfied that the item qualifies for exemption based on recent submissions or your own knowledge of market conditions, prevailing prices, or sources. Having done this, you must put your reasons in writing and include the memorandum in the contract file, keeping it as simple as possible.

The most difficult part of the job is to determine that the item has been sold in substantial quantities to the general public. You may be able to spot a few items regularly sold at retail or know some that are used in commercial products. However, many of the items the Government buys are not so easily identified.

To help you, the SF 1412 divides catalog sales into Categories *A*, *B*, and *C*. Category *A* is for items sold to the Federal Government, Category *B* is for items sold to the general public at catalog prices, and Category *C* is for items sold to the general public at other than catalog prices. The completed SF 1412 will show, for each category, the number of units sold in the period identified.

If *B* and *C* sales are not negligible themselves and are 55 percent or more of total *A*, *B*, and *C* sales of the item, and if *B* sales account for at least 75 percent of total *B* and *C* sales, you may presume substantial sales to the general public. If *B* and *C* sales account for less than 35 percent of total sales of the item, or if *B* sales are less than 55 percent of total *B* and *C* sales, exemption rarely is justified. If *B* and *C* sales account for between 35 percent and 55 percent of total sales, or if *B* sales fall between 55 percent and 75 percent of the total *B* and *C* sales, you must do additional factfinding before you can decide whether to grant an exemption

Table 9-1 illustrates these tests and the decisions based on different mixes of sales.

TABLE 9-1. EXAMPLES OF SUBSTANTIAL SALES DECISIONS

ITEM		A	B	C	B&C	TOTAL	DECISION
1	Units	4500	4125	1375	5500	10,000	
	% total	45%			55%	100%	
	% B&C		75%	25%	100%		Exempt
2	Units	6600	3000	400	3400	10,000	
	% total	66%			34%	100%	Nonexempt
3	Units	6500	1750	1750	3500	10,000	
	% total	65%			35%	100%	
	% B&C		50%	50%	100%		Nonexempt
4	Units	5500	3000	1500	4500	10,000	
	% total	55%			45%	100%	
	% B&C		67%	33%	100%		Investigate
5	Units	5500	3375	1125	4500	10,000	
	% total	55%			45%	100%	
	% B&C		75%	25%	100%		Investigate

The offeror must help your investigation by showing the prices and quantities for *B* and *C* sales on the SF 1412 and telling you the lowest price sale in either category, regardless of quantity, and the lowest price *C* sale at a quantity comparable to yours.

If there were no comparable *C* sales, the offeror is required to tell you the lowest price for *C* sales at the quantity closest to your current requirement. If there were no sales at other than catalog price, the offeror is to tell you the lowest price for *B* sales at the quantity closest to your current requirement and is encouraged to tell you other facts that will help your decision.

You are trying to determine a reasonable price. To find if the offered price is indeed reasonable, considering the quantity to be procured and other facts of the procurement, you need to do price analysis. A catalog price is reasonable if a substantial number of nongovernmental buyers pay the catalog price for comparable quantities. (Catalog price means published price appropriately discounted.) You might presume that the catalog prices are reasonable if the company consistently follows its pricing method and the facts show that substantial sales have been made to other customers. In some cases you may have to negotiate a different price to reflect different circumstances, even though the procurement is exempt from the requirement for submission of certified cost or pricing data.

You can run across situations that will challenge your judgment. You may want to buy a catalog item that is sold to the general public but that is currently sold in relatively small quantities. Should it be exempted? What price should you pay?

You may want to buy a large quantity of an item, but the price quoted is higher than the listed sales price for a smaller quantity. The company's explanation is that it discounted the item below what the quantity would otherwise call for and sold it at the lower price on a one-time basis because it was part of a multi-item, million dollar order. Is the item exempted? What price should you pay?

In another example, the offeror says it can't complete the SF 1412 because it does not accumulate sales data by customer and price for individual orders. The offeror can give you some data on representative sales or, if that won't satisfy, will let the ACO look at the sales records in whatever depth the ACO chooses. You may accept this approach, in lieu of the form, as the basis for a decision on exemption.

If a firm uses product line pricing, you may have another kind of problem. A product line price usually is a cost-based price with standard costs assigned to individual parts and to factory operations. As a part is manufactured, the standard cost of each component is tallied to a total base standard cost of the item. An adjustment factor is added to this base cost to reflect statistical computations of the difference between standard costs and actual costs for the manufacturing operations within the accounting period. A factor for general business expense and profit is added to the adjusted base cost to produce the final price.

The firm sells the total product line in substantial quantities to the general public, but the item you want has been sold only to the Government. Instead of furnishing cost or pricing data, the seller may argue that it is meaningless and will demonstrate that the pricing procedure is the same regardless of the eventual user. The offeror may show you product line data that proves the contention and demonstrates that profit margins are reasonable.

This may convince you that the price is right, but it does not satisfy the requirements of the law. To be exempt from the requirements of the law, the item must be sold in substantial quantities to the general public or its price must be based on the price of a similar item that is sold in the marketplace in substantial quantities.

There are several ways to handle this problem if you are convinced you have a good price. One way is to have the company show you that the item you want is made up of components included in items that are sold in substantial quantities to the general public. If the offeror can do this, you may be able to base your price on those other catalog prices. Another way is to ask that a waiver be granted on the basis that the data demonstrate convincingly that the price is good.

On the other hand, if you are not convinced that the price is good, you must get cost or pricing data and get them certified, even though this may be costly to the seller and total plant data may be required to support the add-on factors.

When the procurement falls within the "investigate" range, there are other factors you may consider. For example, category *B* or *C* sales may include substantial sales to state, local, or foreign governments under circumstances where there may not be a true marketplace.

If your examination of the conditions under which the sales were made leads you to this conclusion, your only recourse may be to obtain cost or pricing data. However, don't go overboard just because there are substantial sales to other governmental bodies. Some items like textbooks, traffic lights, badges, and waste treatment equipment are sold mostly to governmental units.

Perhaps the key factor to consider when faced with an "investigate" decision is the alternative products or services available or the alternate ways to satisfy the requirement. Assume you are buying 1,000 cameras and the purchase request specifies brand *X*. The vendor quotes a catalog price of $150 each and tells you that 45 percent of its sales were in categories *B* and *C* and that 90 percent of these were *B* sales. The catalog shows a price of $175 each and the lowest price, in quantities of 100, is $165. You might first find out why brand *X* was specified.

You find that the requirements technician is concerned about reliability and that there are size limitations. Brands *Y* and *Z* will meet all requirements, but brand X is preferred because it is used in training and has the highest reliability. Brand *Y* has a catalog price of $149.50 and, like brand *X*, is sold in substantial quantities to the general public. Further, a number of individual sales were made for quantities in the 500-750 range. Brand *Z* is not a catalog item but was bought in small quantity for $200 each based on cost analysis. You could probably conclude that $150 is a good price for brand *X* and that the buy is exempt.

The offeror does not have to quote the catalog price in order to qualify for exemption. For example, the catalog price may be the price for an item typically sold in small quantities, shipped prepaid, and warranted for one year. You may need a large quantity shipped on a Government bill of lading for use at a location too remote to make it economical or feasible to take advantage of the warranty. You should negotiate a price based on the catalog but adjusted to reflect the realities of volume, shipping, and warranty.

To make these adjustments you may need cost information about the specific factors, but you will not need to get certified cost or pricing data unless the adjustment exceeds $100,000, even though the certified data will be applicable only to the costs of the adjustment.

If the item is similar to the catalog item, the catalog price can be the base price adjusted for add-ons and deductions. For example, you may want a quantity of commercial devices, but you want them painted red, an add-on. You want a small flange welded on for mounting on a special piece of equipment, an add-on, but you don't want a stand that normally is part of the device, a deduction. These adjustments can be made, using catalog, price list, discount schedule, or other data obtained from the offeror, or from internal sources. This is an example of the based-on concept.

Market price

A market price is similar to a catalog price except that there are generally many sellers and many buyers willing to trade at a given price. This interaction of supply and demand in the marketplace establishes competitive prices.

A catalog price is generally for an item or service unique to the seller, although there may be similar items or services available from others. A market price is generally for an item or service that is generic in nature and not particularly unique to the seller, except for reputation. Unprocessed foodstuffs are examples. Normally, there is a daily market price based upon supply and demand that is monitored by an independent firm or governmental body with prices published in local newspapers.

However, there can be a market without this formal setup. A market is created whenever a seller offers to sell a commodity or service and people regularly buy at the asking price. For example, a window cleaner may regularly quote a price per window, an accounting firm may quote a price per hour, or a local hauler may quote a price per ton-mile.

While these circumstances create a market and establish market prices, you must establish the reasonableness of those prices by further analysis. Are there other sellers in the market selling comparable goods or services? Are their prices comparable, considering quantities and delivery requirements?

The nature of the public quote is what makes market prices different from catalog prices. Market prices generally fluctuate more often than catalog prices due to supply and demand and therefore are not put in a catalog.

Your first concern is to make sure that a market actually exists. The fact that a number of firms provide similar or related services is not necessarily proof that a market for a specific service exists. For example, there would appear to be a widespread market for computer programming and data processing services, but you should determine that performance and other characteristics are enough alike to constitute a market. Using price analysis techniques, you must be able to justify any price differences between your requirement and the services sold at market prices.

An offeror might cite quotations or purchases of similar items or services to demonstrate the existence of a market. However, you must assure the validity and comparability of the data. If the sources are few, there may not be a market.

Your primary objective is to get the going price and you must substantiate the going price through sources independent of the seller. This can be difficult if the price is not regularly published as a market quotation.

SF 1412 requires the offeror to furnish evidence that the quoted price is a market price. You may be able to verify this from current advertisements containing the price. Trade publications often have data about going prices. You might check with other known users of the product or service to see what they are paying or you might have the vendor show you purchase orders from others that show they pay the quoted price.

A market price might exist on a T-M contract, particularly where the work is done by a craftsman. For example, the Government may require a glass blower to make some specially designed items for laboratory work. The glass blower may charge $18 per hour plus materials. If the general public, such as commercial laboratories, hospitals, and factories, regularly pays $18 per hour for those services you have a market price for the services. Of course, you will need to assure yourself of the number of hours and how the material was priced, but even if the order is over $100,000, it probably qualifies for an exemption.

Prices set by law or regulation

When the price is set by law or regulation, the pricing job should be relatively easy. The contractor must identify the regulating authority and specify the regulated prices. A local or regional government usually is the regulating authority for utilities. State or Federal units are usually the authorities for freight rates, franchised carriers, and protected commodities. You may have a problem with local "fair trade" laws. Generally, fair trade prices do not apply to the Federal Government. If a problem exists, seek legal counsel.

You also may have a problem with a vendor who claims to be regulated because it sells mostly to customers who are regulated.

For example, the vendor may sell only to utilities. Because the price paid to the vendor is part of their cost of operations and included in the basis for their regulated prices, the vendor may claim the price is set by law or regulation. This claim will not hold up. The vendor may be able to show a catalog price or a market price, but neither of you should consider this as a price set by law or regulation. Similarly, price control laws that limit prices to some prior maximum price plus regulated changes do not qualify such prices as having been set by law or regulation.

Use of SF 1412

The SF 1412 is used to claim an exemption. It may be used by prime contractors proposing to the Government and by subcontractors proposing to the next higher contracting tier. It is used when the proposed total amount exceeds $100,000 and more than one catalog item for which exemption is claimed exceeds $25,000.

A separate SF 1412 is used for each item. When submitted by a prospective subcontractor, it becomes a part of a prime contractor's cost or pricing data. If considered appropriate, the prime can submit the claim to the contracting officer for determination of the acceptability of the exemption. Whenever it is necessary for the contracting officer to consent to the subcontract, this form will serve as a basis for that consent.

For contractors who do a considerable amount of catalog business with the Government, the procedure has been simplified to minimize paperwork. The contractor may make special arrangements with a single Government purchasing office or with the cognizant contract administration office. It must submit the data and make the representations required by the SF 1412, although it need not be on a SF 1412. The office makes the determination concerning the exemption and the contractor references this determination when proposing.

PCOs can rely upon these determinations to expedite their procurements. However, three points of caution must be emphasized. One, no PCO is bound to accept the determination of another and may make a separate determination if another PCO's determination is faulty or doesn't fit the case. Two, Government approval of an exemption should not extend past one year. Three, any time the office granting approval has reason to think that price or market conditions have changed, it should request new information and make a new determination.

Two other situations may warrant special handling. If you recently determined that the price justified an exemption, you could, in a subsequent procurement, dispense with the SF 1412. You also could forego submission if both the price and sales to the general public were common knowledge. In either event you will recite the facts that are the basis for your decision in a memorandum for the contract file.

The second situation arises when special circumstances justify exemption, even though the data submitted would seem to point the other way. For example, this action might be proper when recent heavy sales to the Government drastically changed the percentage of commercial sales. In a case like this you could get the chief of the contracting office to authorize an exception on an individual or class basis. The price you pay need not be the catalog or market price; you probably will be able to get special discounts for volume if Government purchases have increased to such an extent.

In another example the item was developed for the commercial market and almost all sales in prior years were to commercial customers. Now the items are used mostly by the Government. You can trace the price to the catalog price in effect when substantial sales were made to the general public. You are satisfied that the offered price is reasonable. Again, you could ask the chief of the contracting office to authorize an exemption.

Verification

The claim for exemption may not be enough. In some cases, you will need to verify the data. Verification should be restricted to the facts needed to make a determination. The offeror's signature on the form grants access to books, records, documents, and other supporting data for purposes of verification. If you need to look at supporting data, ask the ACO to do it for you, or ask the offeror to send them.

The kinds of facts that might need verification are the total units sold, the unit prices of listed sales, justification for the cost of add-ons or deductions, market price justification, rates established by law or regulation, and the makeup of categories *B* and *C* sales when the percentages fall between the go/no go criteria.

Don't request verification if you don't need it and don't do it just for the record. Keep it simple and limit it to the parts of the total that are uncertain or significant. You will not seek out cost-profit relationships. You are analyzing the price to justify an exemption. Only if you can't justify the exemption will you get cost or pricing data, analyze them, negotiate, and get a certificate.

Logic chart

The logic chart at the end of this section (Table 9-2) summarizes the process of deciding if a proposal qualifies for the market price exemption to P.L. 87-653. It also can be used to decide if a procurement can be exempted from the requirements relating to cost accounting standards.

The chart lists four criteria (established catalog or market, commercial, sales to general public, and substantial sales) and four questions under each criterion. If you can answer *yes* to one of the four questions, it means that the condition has been satisfied and you can move on to the next criterion. If you cannot answer *yes* to any of the four questions, the proposal does not meet the condition and there is little purpose to asking further questions. You must be able to answer *yes* to one question in each of the four criteria in order to grant an exemption.

Price set by law or regulation, the other basis for exemption, is not included on the chart because the decision is straightforward. Either the price is set by law or regulation or it isn't. If it is, the exemption applies. If it isn't, no exemption.

In all cases involving catalog or market price exemptions, four criteria must be met in determining that an exemption exists:

a. It is an established catalog or market price.

b. It is a commercial item or service.

c. It is sold to the general public.

d. The quantities are substantial.

It is not really important how the questions are answered, so long as the answers clearly establish that the item is a commercial item sold in substantial quantities to the general public for which there is an established catalog or market price.

When the test is met, you can justify an exemption from submission and certification of cost or pricing data. But the item still must be priced. This sometimes requires additional information, and it is possible that confusion may arise from the misconception that it is the exemption being pursued rather than the pricing issue.

There is no need for procedures related to the exemption to become burdensome. If it does become burdensome for either the Government or the contractor at any location, the time has come to sit down together to agree on how to answer the four basic criteria for exemption and to satisfy the pricing question.

The fact that the Government will pay more or less than the formal catalog or market price does not of itself nullify the basis for an exemption if the price paid is based on the formal price within the terms of the acquisition regulations.

Altered terms, minor configuration changes, or quantity differences are all good reasons for pricing items differently from formal catalog or market prices. Your ultimate objective is to achieve fair and reasonable prices for items bought. Both Government and contractor personnel must recognize this and seek innovative ways to satisfy the needs with a minimum of burdensome paperwork.

TABLE 9-2. LOGIC CHART FOR THE CATALOG OR MARKET PRICE EXEMPTION

EXEMPTION CRITERIA, QUESTIONS, AND ACTIONS	IF YES, GO TO	IF NO, GO TO
1. Is there an established catalog or market price?		
a. Is there a printed catalog, price list, published price, or other formal document showing prices and discounts?	2	b
b. Is there common knowledge of a marketplace procedure, such as auction, or regulated price?	2	c
c. If there is a formal price listing with optional discounts, do accompanying sales data validate the discount offered?	2	d
d. Can field contract administration personnel (or audit) validate from offeror's records that the price offered is a regular catalog or market price with appropriate discounts?	2	5
2. Is the item or service a commercial item?		
a. Is the item or service identical to that described in the catalog or obtained in the marketplace?	3	b
b. Is the item or service so similar it can be priced by reference to catalog or market?	3	c
c. Can the differences be identified and priced as add-ons or deducts from catalog or market prices by value analysis or from other known prices?	3	d
d. Can the differences be identified and the cost/price difference determined by cost analysis using data submitted by the offeror (and certified if over $100,000)?	3	5
3. Are there sales to the general public?		
a. Is there general knowledge of large public sales of products regularly stocked by dealers or regularly traded in the marketplace?	4	b
b. Does the offeror's data show sales over the appropriate past period as between Government and commercial customers?	4	c
c. Can field contract administration personnel validate from the offeror's records that sales have been made to commercial customers?	4	d
d. Can audit personnel make the validation?	4	5
4. Are there substantial sales to commercial customers who meet the test of the general public?		
a. Are reported sales to commercial customers at least 55% of total sales and those at catalog price at least 75% of this amount?	6	b
b. Are reported sales to commercial customers at least 35% of total sales and those at catalog price at least 55% of this amount and can you determine this is a reasonable commercial market?	6	c
c. Can field contract administration personnel verify from the offeror's records that commercial sales meet the regulation's criteria?	6	d
d. Can audit verify the data?	6	5
5 With no *yes* to these four questions, the proposal does not meet the test for exemption. Get cost or pricing data and, if over $100,000, certification after negotiation		
6 Exempt. Document file Determine reasonableness of price		

9.2 Spare Parts

The term spare parts identifies material for separate supply and replacement that is required for the maintenance, overhaul, or repair of equipment. Both the character of the parts and the way they are bought influence the way they are priced.

However, if there is a single factor that influences the methods and procedures used to price spare parts, it is volume, the sheer number of different parts to be managed at inventory control points and purchased at buying offices. Frequency of purchase, technological as well as time obsolescence, availability of usable manufacturing drawings and process sheets, and relatively low unit value of a majority of parts are other factors which, when combined with high numbers, influence spare parts pricing.

Big dollar items, such as certain electron tubes, structural parts, and vendor designed and manufactured components generally will be estimated and priced in the same manner as the end-items of which they are a part. Prices of lesser value items may be estimated and priced using a predetermined system.

You can analyze many spare parts prices using price analysis techniques like engineered standard prices, validated past purchase prices, and current market prices as bases for comparison and evaluation.

Work done to screen parts lists to segregate those that must be bought from the prime contractor, those that can be bought directly from the manufacturer, and those that can be bought competitively, when necessary data are at hand, enhances the use of price analysis techniques. So does the maintenance of up-to-date procurement records showing past buys, with sources, quantities, and production rates.

If the parts are to replenish the inventory, you need to find out if the requirement represents an economic ordering or production quantity with adequate procurement as well as production lead time. If lead times are short, can you price and place the orders rapidly? Do the requirements come to you in a long list of many different items or do they come piecemeal, by individual items? Much of the special nature of spare parts pricing traces to the negotiation of prices and delivery schedules for a long list of different parts.

If the spare parts are to be competed and effective competition is obtained, most pricing problems will disappear. Turned around, the problems exist when competition is not possible or does not make sense, when IFBs or other competitive procedures are out of the question.

You will be concerned primarily with pricing spare parts that must be bought sole source from the prime contractor, and these usually are bought on long spares exhibits. It is these numbers that lead to formula pricing methods and catalog contracting arrangements in dealings with major weapon and equipment manufacturers. Both formula pricing and catalogs are discussed later.

Time and timeliness are two important factors in parts pricing and procurement. Procurement methods must be responsive. It is relatively easy to issue an order, priced or unpriced, to the contractor. The job gets tougher when the contract delivery schedule must conform as nearly as possible to the time requirements of the activity that needs the parts, the prices must be fair and reasonable, and if the order is unpriced and the contractor is permitted to start work, the prices must be agreed to as soon after award as possible.

Fair and reasonable spare parts prices

Fair and reasonable describes the conclusion that the price is acceptable and fair to both parties. When price analysis techniques are used, either by themselves or together with cost analysis, fair and reasonable describes the conclusion that the price equates with value, with prices asked for other competing products or services, or with prices paid before. When cost analysis techniques are used, fair and reasonable also describes the conclusion that the price is acceptably close to what it should cost to make or otherwise acquire the item or to provide the service.

Basing price on what it should cost is a concept you may not be able to use in pricing spare parts. Usefulness of *should cost* depends on estimating and pricing methods that develop detailed unit costs. You must be able and willing to spend the time to evaluate present and future costs with an eye to eliminating unnecessary ones. You may not be able or willing to do this with all spare parts line items. The dollar value may not warrant the effort. Even when it does, accounting and estimating methods may not permit that sort of evaluation.

For spare parts, then, it is realistic to say that a fair and reasonable price is one that is close to what it is likely to cost the seller to make or otherwise acquire the part. It also is a price that approximates the value of the part to the user.

Not all companies estimate or account for the cost of making individual spare parts. These companies do have systems for coming up with prices for parts, and the methods are designed to give a reasonable return from total spare parts sales on a contract or period (monthly or yearly) basis. The company's objective in those instances would be to end up with a predicted relationship between spare parts revenues and the cost of those sales. Your objective would be to see that this predicted relationship is acceptably close.

It's difficult to say what an acceptable percentage relationship between sales and cost of sales would be. You can get some idea from the principle in the weighted guidelines technique that a manufactured part warrants a higher profit, and thus a wider spread between cost and price, than does a purchased part.

Even though you must be sure that a contractor's planned sales/cost of sales ratio is reasonable, you can't ignore the unit prices in the parts exhibit. You must check a sampling of prices against parts to see that the method hasn't produced a $20 price for a two-bit item.

Unit price integrity

For a price to have real meaning in each of its uses it has to be fair and reasonable by itself, apart from the total price of the contract. Unit prices are used for payments, partial termination settlements, budget estimates, comparative price analysis, and foreign military sales. You have to analyze and negotiate in such a way that spare parts prices have integrity, that is, represent value.

Integrity may be hard to achieve in pricing out a list of spare parts. When you have this job, first be sure the company's method of pricing spare parts has been reviewed and found to be acceptable. This is important because you will be relying to a certain extent on the method to produce prices which, in turn, are acceptable. If the list contains just a few items, say 10 to 15, you will get a fully executed SF 1411 for the total and a unit cost estimate for each part. Then you will analyze and negotiate as necessary.

At some point when the number of line items is large and the unit prices of many are small, it doesn't make sense to analyze and negotiate each part separately. When you reach that point and need to sample, you do not necessarily go the whole way to statistical sampling. You could use what is called the ratio estimate method and require the contractor to submit an SF 1411 and cost estimates for the total and cost estimates for spare part items selected at random for analysis.

The SF 1411 would show in block 6 the cost, profit/fee, and total of the list, and it would have a breakdown of that total as between the several elements of costs. (However, if the spare parts are being priced for a Government catalog, there will not be a total price. In this case, the SF 1411 would identify what was being pricedand reference the documents that contain the cost or pricing data.)

You analyze the items selected for sampling and negotiate agreement on the price of each. Next, you develop the percentage relationship between proposed and negotiated prices and apply that factor to all the other items on the list. As the last step you make a value review looking to make sure there are no $400 prices for $20 items. This value review is very much like what is called "eyeballing" in Chapter 2. You look at a part, or a picture of a part, to spot the obvious glitches.

To illustrate the sampling approach, assume a list of parts with a total proposed price of $97,375. You randomly select seven items, with a total value of $64,515, and after analysis, negotiate with the offeror. You agree on individual prices which, when totaled, amount to $62,075 or 96.2 percent of the $64,515 proposed. These actions are summarized in Table 9-3.

TABLE 9-3. COMPARISON OF PROPOSED AND NEGOTIATED PRICES

PART NO.	QUANTITY	PROPOSED		NEGOTIATED	
		Unit	Total	Unit	Total
W33601G	150	$ 173	$25,950	$ 165	$24,750
W33600A	25	7	175	7	175
W33676Y	70	60	4,200	58	4,060
R27325L	210	15	3,150	14	2,940
M27-4510	10	2,536	25,360	2,490	24,900
MS4265B	50	38	1,900	35	1,750
LS51892Z	70	54	3,780	50	3,500
			$64,515		$62,075

Next, you adjust the remaining items on the list by multiplying each unit price by the factor of 96.2 percent. However, if fixed, nonrecurring costs have been allocated to each part on the list, this approach may not be equitable. If it isn't, you should use another method or, if possible, treat the nonrecurring costs in total as a separate line item.

If the list to be priced has enough line items to justify the approach, use statistical sampling methods. This will make both your selection of items and the results of the factoring more defensible.

If the quantity is sufficient to require sampling, these data must be stratified for materiality and sensitivity. Because stratification is determined subjectively, each item separated from the mass for materiality and sensitivity is examined and evaluated separately. After stratification, a random sample could be selected from the remaining items. The following summarizes the results of three independent random subsamples from a group of approximately 2500 spare parts.

The subsampling procedure adds to the intuitive acceptance of the combined results (93.53 percent) because the individual factors (ratio estimates) do not differ significantly from the combined factor (see Table 9-4).

TABLE 9-4.

RANDOM SAMPLE GROUP	PROPOSED	NEGOTIATED	PERCENT
A (50 items)	$ 41,591	$ 38,341	92.19%
B (50 items)	34,246	32,120	93.79
C (50 items)	46,407	43,869	94.53
TOTAL	$122,244	$114,330	93.53%

Upon completion of negotiations, based on a sampling of the total list, you would get a certificate of current cost or pricing data from the contractor. The certificate would attest to the completeness, accuracy, and currency of all the cost or pricing data used in pricing the list. In this example you get three kinds of cost or pricing data and each is important to the certificate.

The first is the method the contractor uses to price the total list. This is factual and verifiable. The second is the list itself. This contains certain facts dictated by the method. The third is the detailed facts supporting the cost breakdowns for the items selected. A defect in the facts about an item not selected for detailed analysis may affect that item only; a defect in the method or in a selected part could affect the prices of all the items on the list. Make sure the contractor understands this.

The contractor's system of pricing

When price competition is not present, you must know the methods the company used to price a spare parts order. This is particularly true when spare parts amount to a significant dollar volume in a given plant or for a given company, and the number of orders to be priced out and the number of different parts on each order do not permit the company to estimate and price each line item.

Just as it may not be economical or necessary for the company to use detailed estimating approaches appropriate to end-item pricing, you rarely have to analyze and negotiate each spare parts price in a long list that includes a wide range of unit prices and quantities.

When dealing with large companies doing extensive business with the Government, you should operate under a more formal arrangement. You should get from the company a written statement of how it prices spare parts and the policies and procedures it follows.

You then should agree on an acceptable method and you should establish within the Government the procedures that will be used to review the priced spare parts list and to document the results of the review. The pricing procedure would be part of the data and subject to the certification.

How this formal arrangement gets set up will vary, depending upon the identity of the principal buying offices, how many there are, and how much spare parts business they do with the company. The ACO can start it with a statement of intent to the buying office and an invitation to participate, or a PCO can start it by notifying the ACO.

In any event, the principal buying activities working with and through the administering activity should establish and agree upon the procedures to be followed in pricing and reviewing the spare parts bought from the company. They should put together a spare parts pricing package, somewhat as follows:

a. Written agreement between the company and the Government representatives describing how spare parts will be priced.

b. Written description of how the local Government personnel check priced spare parts lists. (Objective: to determine that the contractor followed agreed procedures and that the results were fair and reasonable. Statistical sampling techniques will usually be used.)

c. Negotiation memorandum covering pricing factors.

d. Certificate of current cost or pricing data executed by the contractor at the completion of negotiations with clear identification of what it covers.

The written agreement and description will be revised as procedures change. New negotiation memorandums will be written periodically, as required by new rate negotiations. This will usually be at six- or 12-month intervals, depending on the agreed methods. Copies of these documents, and of the estimating methods report by the auditor, will be sent to the Government buying offices that do significant business with the company.

All this is to make sure the contractor has a method for pricing spare parts that will produce acceptable results. Having both the method and the review procedures a matter of record makes the task of pricing documentation a manageable one. With these already in writing and on file, all the administration activity has to do is verify, by applying its standard procedures, that the system was followed, and so inform the buyer .

The buyer then has a proposal from the company, supported by an SF 1411, cost estimates for the total and selected items, a certificate of current cost or pricing data that relates to the factors used to compute the prices of all items, and a statement from the ACO that the standard methods were followed and the results acceptable. After a review to see that all is in order, the buyer can accept the proposal package and award without further negotiation of price.

After identification of the procurement, documentation can be something as simple as this: "Contractor proposed prices computed in accordance with approved methods described in document dated 5 Dec 19X5. Review by the DoD contract administration office confirms this and indicates results are acceptable. Certificate executed applies to this procurement. All documents referenced herein are on file in our pricing office. Accordingly, contract prices are found to be fair and reasonable."

Formula pricing

Many companies use some type of formula when pricing spare parts. Formula pricing is a systematic method of pricing that is used in place of detailed estimates of the costs of individual parts or assemblies. Basically, this approach to pricing is an expedient that is necessary because the preparation of bid proposals, contract changes, spare parts, and other kinds of multiple-item procurements is a high-volume operation.

The primary objective of formula pricing is to handle the workload expeditiously, with minimum manpower, and at the same time to achieve sound pricing. It simplifies procedures and reduces company and Government administration costs. Fewer persons are needed for pricing than if each individual item were negotiated separately.

A pricing formula conforms with the contractor's disclosed practices in accounting for and estimating costs. Formulas are analyzed and reviewed by audit and pricing personnel before negotiation by the contracting officer. Because accounting and cost treatments differ among companies, there is no standard format for pricing formulas.

The concept of a pricing formula starts with estimated costs of the material and labor needed to produce each line item. The addition of allowances for direct expenses incident to manufacturing the product, plus indirect expenses such as material scrap, material handling, and manufacturing overhead determine total cost. A selling price results when profit is added.

Detailing each and every element of cost, starting with the procurement of material and following the part as it goes through manufacturing, testing, packaging, and shipping may result in a price that is very close to actual cost. However, cost detailing is time-consuming and impractical when hundreds or thousands of items must be priced within a short time.

Formula pricing has been developed to speed the process. In its basic form, formula pricing applies previously agreed-to factors, such as material handling, factory overhead, administrative expense, and profit, to the labor and material costs estimated for each item. With realistic estimating of basic costs, including any setup and tooling charges, and equitable distribution of other costs to line items, formula pricing can produce sound pricing of a large group of items.

The basic data needed are estimates of (1) labor hours required to perform each machine or hand operation or assembly and (2) the cost of the material necessary to produce the quantities ordered. The machine time is modified by normal expectations of idle or unproductive time, tool rehabilitation, rework, and replacement. The setup time may be modified to account for the estimated number of production releases that experience indicates are to be required to produce the items. This data requirement is greatly simplified if the company uses a standard cost system.

The modifying factors are rate projections tested against both expectations and experience. As an example, if total annual direct labor hours were estimated at 1,000,000 and 10,000 of these hours could be expected to be charged to nonproductive time, the ratio of nonproductive to direct labor hours would be 1 percent. With ratios established for each modifying factor, the labor formula would be developed as shown in Table 9-5.

TABLE 9-5

Estimated direct labor hour		100.0
Tool rehabilitation	1.5	
Setup	10.8	
Rework and replacement	2.6	
Nonproductive time	1.0	15.9
Labor factor		115.9

Manufacturing overhead, at a cost per hour of direct labor, may be added to the average labor rate to determine a labor-hour rate, as shown in Table 9-6. The average labor-hour rate may be adjusted to incorporate upgrading, anticipated wage increase, cost of living adjustment, and similar items.

TABLE 9-6

Average labor rate	$ 4.50
Manufacturing overhead	8.10
Labor-hour rate	$12.60

Total labor cost would be estimated in the following manner:

Labor cost = hours x factor x rate.

The material factor may be developed in a similar manner by establishing ratios for such cost items as material loss or shrinkage, price fluctuation, functional test, inbound transportation, material procurement, stock handling, and packing and crating. These various cost items may be treated separately or grouped, as determined by the contractor's cost accounting system, in the manner shown in Table 9-7.

TABLE 9-7

Basic material cost		100.0
Price variance and shrinkage	2.3	
Test	1.4	
Inbound transportation, handling, packing, and crating	8.3	12.0
Material factor		112.0

Total material cost would be estimated as follows:

Material cost = base material x factor.

Using the factors and rates developed for material and labor, a hypothetical pricing action for an item with base material cost of $20, labor estimated at 15 hours, G&A at 4 percent and profit at 9 percent would be as shown in Table 9-8.

TABLE 9-8

Material ($20 x 112%)	$ 22.40
Labor (15 x 115.9% x $12.60)	219.05
Manufacturing cost	$241.45
G&A 4%	9.66
Total Cost	$251.11
Profit 9%	22.60
Unit selling price	$273.71

This pricing action also may be done by complete factoring, which means combining all separate rates into single factors for material and for labor, and multiplying the base material and labor costs by such factors. The factors in Table 9-9 are computed using the same figures as shown in Table 9-8.

TABLE 9-9

Base material		1.000
Loadings	12%	.120
		1.120
G&A	4%	.045
		1.165
Profit	9%	.105
Material factor		1.270
---------------------------	----------	--------
Base labor		1.000
Loadings	15.9%	.159
		1.159
Overhead	180%	2.086
		3.245
G&A	4%	.130
		3.375
Profit	9%	.304
Labor factor		3.679

Using the same base costs, $20 for material and $67.50 for labor (15 hours x $4.50 average rate per hour), the result of complete factoring would be as shown in Table 9-10.

TABLE 9-10

Material ($20 x 1.27)	$ 25.40
Labor ($67.50 x 3.679)	248.33
Unit selling price	$273.73

Both methods give essentially the same result. Complete factoring is an effective method of combining the various elements of cost and profit and is especially useful when large numbers of individual spare parts are to be priced.

The prime contractor usually prices subcontracted items by using a formula that includes loading factors representing costs incurred in dealings with the subcontractors. A pricing formula for subcontracted items is shown in Table 9-11 and an example of its application is shown in Table 9-12.

TABLE 9-11

Vendor price		1.000
Material factor (rework and replacement, test articles, tool service, test, plating)	.9%	.009
Material cost		1.009
Packing	4.1%	.041
Subtotal		1.050
Profit	9.0%	.094
Total pricing factor		1.144

TABLE 9-12

Vendor price	$20.00
Factor	x 1.144
Selling price	$22.88

The reasonableness of prices derived through formula pricing depends on the way in which base costs for material and labor are developed and upon the realism of the mark-up factors. Analysis must confirm the applicability of each loading factor and the factual basis for direct material and labor costs. An error in computing material or labor costs will be compounded in the application of the formula.

This approach will be questioned by those who have a hard time accepting pricing on other than an individual item basis. Formula pricing distributes costs systematically over all items. Because of this, an item may be assessed a share of certain indirect costs not applicable to it and may seem overpriced. Conversely, an item may not be assessed its full share of some other indirect costs and may seem underpriced. Pricing equity must be based on the total pricing arrangement as determined by a systematic sampling of individual item prices to test for value and integrity.

It also can be argued that formulas remove the risk from pricing and assure the company a minimum profit equal to the percentage of profit included in the formula. This criticism assumes that because formula factors and rates are derived from an averaging of the contractor's estimate of costs (the estimate is projected from a base of actual costs), the contractor is insured against any loss, profit is guaranteed, and risk is removed from the pricing results.

This criticism is valid only to whatever extent the parties delay in establishing or applying a formula. If the formula is intended for the 12-month period 1 Jan - 31 Dec, but is not developed until 15 April and if it is applied to the costs of parts already manufactured or purchased, the probabilities are strong that the company will make close to formula profit on the sales of those parts.

The only real uncertainty would be the realism of the estimated loadings in the formula. However, even if there were a greater likelihood of low or no-risk pricing than actually exists, we know of no other method that will provide prices on extensive lists of spare parts within the existing time and economic limitations.

Special catalogs

There are two broad classes of catalogs: the ones you cause the contractor to develop for your special use and the ones it develops for use by everyone. This section is devoted to the ones you cause to be developed.

A catalog arrangement is not a separate type of contract. It is the term used to identify an agreement with the following characteristics:

a. A list of specific spare parts that are covered by the contract.

b. Price or prices for each spare part item. (Prices in the event there are quantity price differentials.)

c. Delivery schedule for items, if ordered.

d. Commitment that DoD components, during the life of the contract, will buy all requirements for listed items from the contractor.

These contracts are limited to sole source items that must be bought from the contractor and are used to buy replenishment spare parts.

The first step in developing a catalog is to select the sole source spare parts to be included. The success of the catalog, and particularly its impact on pricing workload, depends on the ability to select, in a timely fashion, a list of parts that for sound technical reasons must be bought noncompetitively. To be considered for inclusion, an item must be screened under the DoD high-dollar spare parts breakout program and must not be a likely candidate for breakout within the time period of the contract.

Success also depends on the ability to handle quantity differences. A price for a quantity of 100 may not be reasonable for a quantity of 10 or a quantity of 250. Because you probably won't be able to predict the quantities in which the parts will be ordered, or the frequency of orders, you will need to develop a way of tieing price to differing quantities.

The contract should usually be an indefinite delivery, requirements type. The contract will be the document from which parts will be ordered, as needed, at the prices set out in it. The format may vary, depending on the equipment to which the parts relate, the accounting and estimating methods of the company, and other circumstances peculiar to the situation. However, the following information should generally be furnished for each part listed:

a. National stock number.

b. Contractor's and manufacturer's part number.

c. Nomenclature.

d. Unit prices and quantity or quantities to which they relate.

e. Production lead time and guaranteed rate of delivery.

f. Noncompetitive procurement identification code.

Unit Prices

The quantity/price relationships must be stated. The idea that the higher the quantity the lower the price is a sound one. The concepts of discounted prices for quantity can be made to work where an increase in quantity broadens the base for amortization of fixed and semi-fixed expenses, permits use of more economical production methods, allows more orderly scheduling of procurement and production of parts, or leads to a more rapid turnover and thus more efficient use of capital. This quantity/price relationship can be treated in several ways, three of which are:

a. A single unit price with a prospectively negotiated discount schedule applicable to individual order quantities or to a cumulative quantity.

b. Unit prices for each of several quantity ranges, with ranges based on economic ordering or production quantities suitable to the particular part.

c. A price per unit with a fixed total setup charge.

If the contractor uses a standard cost accounting system, the standards may have been set on assumed quantity bases, in which case a single unit price may express the relationship to quantity in acceptable fashion.

The contractor can help you develop a method to fit the circumstances. The auditor, price analyst, and production specialist also can help. If quantity discount schedule or quantity ranges are used, they can be different for different items; they don't have to be the same for every item in the contract.

Production Lead Time and Delivery Rate

The contract should include the agreed-to production lead time and rate of delivery for each item. Prices should be established on the basis of those schedules and orders should be placed so as to accommodate those dates as much as possible. However, the parties should recognize in the contract that it may be necessary, from time to time, to compress lead time or accelerate delivery.

Noncompetitive Procurement Identification Code

Each catalog item should carry a symbol to identify the principal criterion that dictated that the part be bought sole source. Each reason (incomplete data package, reliability control, or proprietary process, for example) should be given a separate code. An item should be coded at the time it is selected for catalog coverage. The sole source criterion must be consistent with the policies of the high-dollar spare parts breakout program. The contract will include a key to explain the symbols used.

Price Arrangements

The foregoing has given the broad outline of the catalog. Within this framework, the pricing techniques you use should be those best suited to the situation. The situation is governed by such things as the end-item supported, its stage in production, and the contractor's accounting and estimating methods and practices.

The prices should be FFP, although the use of quantity discounts is an acceptable departure from this principle. In exceptional cases, when firm fixed prices would be impossible or undesirable, another authorized type of fixed-price arrangement would be an acceptable alternative. If FPI is to be used, the prices will identify both cost and profit and will be the target prices. The share arrangement will apply to the total of all the parts ordered; the contract target cost will be the sum of all line item target costs, multiplied by the quantities ordered, and the contract target profit will be computed similarly. Total cost, for the purposes of the incentive, will be the total cost of all items ordered under the contract.

The following pricing provisions should be the basis for negotiating a catalog and should be made a part of the resulting contract:

a. Prices will be established for a specified future time period. We suggest 12 months.

b. For the period of the contract, all DoD procurement of a cataloged part will be made from that contractor and the contractor will furnish the part at the price established in the contract.

c. The prices are for parts placed on order during the period. The date of the order governs, even when the part is to be delivered after the expiration of the contract period.

d. The procuring activity, not the contractor, is responsible for pooling requirements to take advantage of quantity discounts. Unless cumulative discounts have been negotiated, quantity discounts should be based on the quantities on the individual order. If several procurement activities can be expected to order the same parts, it may be a good idea to ask the contractor to batch all orders received in a specified period. For example, all orders received within a defined period (like 30 days) would be considered together for pricing purposes.

e. A requirements-type contract will be used. The contract will identify, by name, the activities authorized to order against it. These activities will pay the prices in the contract and otherwise abide by the agreement. Each activity identified will be given the opportunity to participate in the negotiations and will be sent a copy of the contract.

Contractor's catalog

A sales catalog put out by a company falls in the other broad class of catalogs. A manufacturer or other seller lists the items to sell and shows prices for these items. As a rule, there are other lists or documents that will show the currently quoted adjustments to the list, either discount or premium.

How the seller calculated these prices is not known, generally, nor is it a matter of concern to commercial buyers. A buyer who wants or needs the part buys it at the best terms available. If there are other manufacturers selling the item, or selling similar items, each of which will do the job, the buyer gets it from the one offering the most favorable terms. If only one seller is offering it for sale, the buyer bargains with that seller, if possible, and agrees upon terms.

To be useful, however, the prices in this class of catalogs must be tested against the criteria for identifying established catalog or market prices of commercial items sold in substantial quantities to the general public. The catalog or other form must be published or otherwise available for your inspection, and it must state prices at which sales are currently or were last made to a significant number of buyers representing other than affiliates of the seller. Determination that the number of buyers is significant is a matter for your judgment. The SF 1412 is the tool to use. That form and other aspects of catalog pricing are discussed in Section 9.1.

Evaluation of costs and prices

Spare parts prices are evaluated using the same techniques used to analyze end-item prices. As with end-items, the specific techniques will depend on how the spare parts are being bought (competitive or sole source), the dollar value of the procurement, and how the contractor priced the parts. If the pricing can be supported by competition or catalog or market prices, you will use price analysis techniques. When cost analysis also is required, the method used to price will determine the type and extent of analysis. It probably will be on a sampling basis.

Consideration must be given to costs that usually are not incurred in producing the spare part or are not allocable to both the end-item and the spare parts. For example, assembly labor, start-up costs, rework, and tooling and development engineering may be allocated to end-items only. In contrast, costs of packaging, packing, and container rework are incurred in the conduct of spare parts business and may not be allocated to end-items.

Replenishment spare parts may require consideration of such charges as removal of tooling from storage, repair or replenishment of tooling, preparation for production, and other charges relative to reactivation of the production tooling.

Frequently, individual spare parts may appear on a succession of exhibits over a period of months or years. Spare parts should be compared with priced parts in the end-item and with prior spare parts prices to test the reasonableness of prices in a current exhibit. Trend analysis can be used to test prices, but price trends can be misleading when the quantity of parts involved and the conditions surrounding the individual procurements differ significantly.

Markups (indirect cost allocations plus profit) sometimes may seem high in relation to efforts directly associated with acquisition of particular parts. Certain efforts vital to the continued operation of a company will result in costs that cannot be associated with any product.

The method of allocating these costs to products will be a compromise between the number of cost centers used to segregate only like items from each base and the practical limitations on the number of burden centers that can be handled economically. The compromise will produce costs of individual items that will appear high in some cases and low in others. The effects of this distortion should be weighed against the added cost needed to achieve a more precise allocation.

Two principles must be observed in reviewing priced exhibits:

a. Agreement will be reached with the contractor on how a list or series of lists is to be priced before the pricing is done.

b. The contractor is responsible for arithmetical and clerical accuracy of a priced exhibit.

Both rules are invoked to assure the best use of time and manpower. Advance agreement on method and factors will reduce the need for recomputation and rerun of priced lists. If the contractor accepts responsibility for accuracy it saves time for correction and rerun and reduces the time for analysis and acceptance of lists.

The large number of details in a typical list presents an opportunity for arithmetical and clerical mistakes that may result in serious errors in the aggregate dollars involved. Testing for details on each list is essential to a determination that pricing is fair and reasonable.

For plants with large spare parts procurement, a review and periodic testing of the contractor's pricing methods represents the principal safeguard against frequent clerical errors in lists, but even in such cases some testing should be made of the detail in each list.

For smaller contractors and vendors or for other contractors with infrequent spare parts orders, a prior review of the accounting system and pricing methods may not have been made and, consequently, a larger percentage of the details included in the list should be tested. Tests of details on a priced spare parts list, if done selectively, should be done on a random basis. The test of individual items should be completed regardless of the difficulties encountered. If the test of a list discloses numerous errors, it should be returned to the contractor for complete recheck and correction.

Production and shipment of spare parts may be significant in terms of dollars and unpredictable in terms of time. Consequently, the experience of prior periods and the basis of forecasts must be analyzed. Estimated costs, pricing factors, estimated volume, and other forecasts used in developing and negotiating spare parts prices should be tested periodically against actual results.

Loading factors used in pricing formulas should be tested against experienced costs at least annually and the experience of the contractor should be reviewed more frequently if important fluctuations in volume occur. Auditors should make these reviews. Contracting officers should work out some standing arrangement to be sure the job gets done. When given enough notice, the auditor can generally schedule this without trouble.

Preservation packaging and packing

Contractors do not account for and recover the costs of preservation packaging and packing in any one standard way. The earlier examples of pricing formulas show three different ways of handling these costs. FAR Table 15-2 suggests preservation packaging and packing as an example of the type of cost that should be entered in the *Other Cost* category.

Companies don't even agree on what to call this effort. One calls it *preparation for shipment*, another *boxing and crating*, and a third *packing*. The important thing is to find out what the contractor calls the act of packaging and how it collects the costs. Packaging does not present any special pricing problems, however, once the costs have been identified. Most companies recover the cost by factoring; the factor is, or should be, supported by historical costs.

Packaging specialists are available to most procurement and contract administration activities. They should be included on the negotiation team when packaging costs are significant. You should use these specialists to assure that the packaging requirements are adequate but not excessive, and to get expert opinion on the quantities and prices of labor and material needed to conform to the requirements.

Cost or pricing data

Even if you go by total rather than line item price, a great number of spare parts buys will not aggregate to exceed the $100,000 level that makes it mandatory to get and use cost or pricing data. If procurement history of a given item provides a basis for comparison of present with past prices, or if the part has been evaluated by engineers under the auspices of your organization's competition advocate, you may rely on price analysis techniques. In other circumstances, however, cost analysis may be used to evaluate the offer, regardless of dollar value, and cost or pricing data may be necessary on contracts of $100,000 and less.

The formula approach to pricing spare parts means cost analysis can be used without imposing a burdensome requirement on either company or Government personnel. Once the method has been described in writing, agreed to, and put into operation, both parties meet periodically to examine actual cost experience, forecast costs for future periods, and agree upon the factors for the formula in the forward period. These factors then can be used in any negotiation.

The contractor executes a certificate of current cost or pricing data at the completion of the negotiations for the initial spare parts buy. This certification is good for use on subsequent orders as long as the formula is used in the approved manner. Updated certificates are not required for individual orders priced out subsequently using the formula and the method.

When there is no spare parts pricing arrangement with a company, you may use limited cost analysis on those procurements under $100,000. You ask the company to use SFs 1411, but requests for cost or pricing data are restricted to one or two critical areas, most likely in direct costs.

The preceding comments are directed at the use of cost analysis in pricing sole source military use spare parts with emphasis on buys under $100,000. If items fall in the commercial category, cost or pricing data and cost analysis are, of course, unnecessary. You ask the offeror to support the claimed commerciality. If you anticipate this sort of response from the offeror, you ask for that support in the RFP. The contractor should use the SF 1412 when claiming commerciality.

9.3 Warranties

A *warranty* is a seller's promise or affirmation regarding the nature, usefulness, or condition of supplies or the performance of services furnished under a contract. More directly, and in particular reference to a commercial item, a *warranty* is a seller's promise that the item, if used properly, will perform without failure for a specified time. If it is not misused but fails within that time, the seller promises to repair or replace it at little or no cost to the buyer.

The FAR describes the circumstances when warranties may be used. The DFARS describes the circumstances when warranties *must* be used and prescribes procedures for obtaining waivers when, for example, a warranty would not be cost effective.

Warranty provisions are to be tailored to the procurement. The remedies, exclusions, limits, and duration written into the warranty clause are to fit the facts and expectations of the specific case. In addition, benefits estimated to result from a warranty must be commensurate with their cost to the Government. If not, a warranty is not to be included.

Warranties will cost you money; sellers will charge for accepting the deferred liability created by warranties, and the Government will incur costs in administering and enforcing them. The seller stands to incur costs in repairing, replacing, or paying someone to repair a defective product, and to transport it to the plant and back. The seller might agree to an equitable reduction in contract price rather than to repair or replace.

To evaluate the cost of a warranty, you need to find out the assumptions and the data the seller used in estimating. The seller will need to estimate the frequency of failure, the cost of transportation, and the cost of labor and material to repair or the cost to replace. You can expect the seller to use cost experience to price the warranty. If the product is new and operational experience is limited or nonexistent, the seller may use experience with a similar, earlier product or may make other assumptions about the frequency and nature of the repairs.

In comparing benefit with cost, you will need to include the cost of any special procedures installed to make sure that users and maintenance and supply people know of the warranty and what to do when a warranted product fails. You also will estimate the cost to the Government for handling and preparing the defective product for shipment.

To this point we have assumed that you can identify the estimated warranty cost included in a proposal. In the case of commercial products, you may not be able or even have the opportunity to evaluate warranty costs. You will not have a proposal with cost or pricing data, and the seller probably will not quote you a price without warranty. Stated another way, if a warranty is customary in the trade, the cost of the product to the buyer is likely to be the same, warranted or not. If such is the case, you might as well get the warranty.

9.4 Pricing Procurements for Foreign Military Sales

Procurements for foreign military sales (FMS) are subject to special considerations. First, the ultimate customer is a foreign government. If the procurement is noncompetitive and is expected to exceed $10,000, the identity of that customer already has been told to the prospective source in the process of obtaining prices, delivery, and other information. In turn, those data have been furnished to the foreign customer for its information and influences that country's decision to commit itself to bear the cost of the procurement.

Second, under FMS, financially independent countries of the free world can buy needed military equipment and thereby carry a share of the common defense burden. FMS helps a developing nation attain the minimum security and stability needed for its development. Thus, the objective of United States foreign military sales is to promote the defensive strength of friends and allies. FMS also can promote the concept of cooperative logistics and equipment standardization and offset in part the unfavorable balance of payments resulting from military deployments abroad. For these reasons it is in the public interest to increase the sale of American-made military items to friendly nations.

Third, in buying for FMS you will be half in and half out of a different market and will need to recognize the characteristics and customs of that market. You may and probably will find yourself buying the same items from the company, some for a DoD user and some for a foreign customer. You probably will be asked to pay different prices for the same item, with the FMS price being higher. One example of costs used to justify an FMS price would be selling expenses for a company that maintains an overseas or export sales organization. Another would be the cost of post-delivery support services for which we customarily contract but which the foreign customer might require as a warranty of sorts without any special arrangement.

Fourth, the foreign nations have been assured that the United States Government will use its best resources to insure that the prices paid are reasonable. You must use the same care and diligence and the same techniques in pricing FMS as you would if you were pricing a DoD buy. Although new or unfamiliar areas of cost must be considered, there is the same requirement for certified cost or pricing data and the principles regarding competition, price analysis, and cost analysis apply to these sales to the same extent they apply to sales for DoD consumption.

Typical problems

To illustrate the problems you may face in pricing FMS, assume you have a requirement and that:

a. DoD has been the only buyer (and user) of the equipment and there is only one company that makes it. In the past you have used cost or pricing data and the concept of what it should cost in analyzing and negotiating a fair and reasonable price. Now that you have the FMS quantity, there is to be a second user. Has anything really changed?

Your answer is "not really." You still look at cost or pricing data and at the effort required to perform the contract. If the contractor is likely to incur added expenses as a consequence of selling to the foreign user, you may consider these in arriving at the price to be paid.

b. DoD is one user, but the equipment also has been sold to a commercial user. There is only one company that makes the particular equipment, but three others make and sell products designed to do the same job. Until now, you have used cost or pricing data and priced on the basis of what it should cost. The offeror for the FMS requirement says the equipment is commercial and does not submit cost or pricing data. The offeror does give sales information that identifies quantity, price, and delivery rates for the past year. The commercial price level is 20 percent over prices you have paid for the same equipment.

What's a fair and reasonable price for this FMS procurement? Would it make any difference if the procurement at hand included quantities for U.S. military use as well as FMS?

c. DoD is one user, but the equipment has been sold to the end-item manufacturer for both installation and resale, and to parts suppliers and end-item users for replacement. The equipment manufacturer maintains a priced sales catalog regularly and uses it to price orders to commercial customers. The list prices in the catalog are much higher than the prices you have paid and even when discounted in the proposal for the FMS equipment, they remain higher. What do you do about price?

d. DoD is one user. It had caused the basic system to be developed. Two models of the system also have been sold directly to users, both U.S. and foreign companies. When you have bought for DoD use, the company has submitted cost or pricing data or identified it in writing. The company claims the model required for the FMS customer is commercial and does not furnish cost or pricing data. The commercial models differ from the military chiefly in the kinds and numbers of black boxes hung on the basic system. What is a reasonable price and what do you use to figure it out?

The basic problem, as is obvious from these examples, is to determine the true nature of the market. In other words, you find out what has been sold, in what quantities, when, and to whom, and the kind and extent of competition. If sales have been made to foreign customers, you should find out what kind and how much effort the company had to expend to make those sales, the size of any sales office,and the nature, frequency, and cost of post-delivery services that the company has had to supply. These inquiries may be necessary and particularly relevant when the company tries to justify a higher price than you would pay buying for U.S. consumption.

Pricing by cost analysis

Costs may be incurred in the foreign military market that would not be allowed or recognized in the domestic military market. In deciding how to treat these costs, you should understand that in the domestic military market there are two conditions of nonallowability. Certain costs are unallowable because they are held to be unnecessary or not allocable to defense contracts. However, these costs may be necessary and allocable to the contractor's other business including sales to foreign governments. If so, they should be recognized in cost analysis for FMS.

Other costs may be necessary expenses of doing business that the United States Government, for reasons of public policy, labels unallowable, and expects contractors to pay out of their profits. These expenses include advertising, interest, and entertainment costs. These are also unallowable as costs in pricing FMS, but they may sometimes justify higher profit rates on FMS procurements.

You should use weighted guidelines to establish your profit objective, just as you would for any other procurement where cost analysis has been performed. However, you may recognize an added profit on FMS.

The weighted guidelines technique permits you to consider, under contract cost risk, additional risks associated with FMS. To decide how much, you must distinguish among the efforts and risks of contractors. First, you would provide differently for the contractor who establishes and maintains an effective sales force and the one who does not.

Second, you would separate the contractor who accepts substantial risks in the foreign military market and the one who doesn't. These risks might include responsibilities for providing a technical cadre to help the foreign customer maintain the equipment, a parts inventory, training, and other post-delivery functions. Another risk might be what follows from the need for large sales promotion efforts such as advertising and exhibits. However, the total profit under contract cost risk can't exceed FAR limits for different contract types.

Recovery of nonrecurring costs

A customer (foreign government, international organization, foreign commercial firm, or domestic organization) is expected to pay a fair price for the values of DoD's nonrecurring investment in the manufacture of products and development of related technology. When dollar thresholds are met, the DoD sales offer to a customer includes a charge for DoD investment costs.

Thresholds are pegged at costs of $5 million for two different categories: (1) with respect to products and technology, the $5 million can be for nonrecurring research, development, test, and evaluation costs, or it can be for special customer nonrecurring costs; and (2) with respect to products, the $5 million is for nonrecurring production costs.

A pro rata share of the nonrecurring cost will be added to the price and refunded to the Government. Usually, the system program office will calculate the pro rata amount and coordinate with the Director, Defense Security Assistance Agency. DoD Directive 2140.2, "Recoupment of Nonrecurring Costs on Sales of USG Products and Technology," contains criteria as to what costs are or are not to be included, when a waiver will be obtained, and how collection will be handled. These, too, should be taken up with the Defense Security Assistance Agency.

In addition, DoD Instruction 2140.1, "Pricing of Sales of Defense Articles and Defense Services to Foreign Countries and International Organizations," specifies that a pro rata share of recurring support costs will be recovered when related to the current production contract.

These FMS costs include: Government-provided material such as fuel; Government-provided engineering services such as in-house test and evaluation; quality assurance such as the costs incurred by DCAS; contract production test, destruction, and evaluation, if in another contract or performed by the Government; Government-provided transportation, packing, crating, and handling such as Government bills of lading; OSD-prescribed administrative charges; recurring costs of technical documentation such as handbooks and technical manuals; and the cost of contract audit (DCAA).

Country-to-country agreements

Before signing off in a negotiation with an offeror, make sure the agreement is consistent with any agreement, executive or diplomatic, that exists between the United States and the foreign government. If the agreement is different from DFARS or FAR, the agreement takes precedence. While the contractor may know if there is an agreement between the countries, the system manager is the most logical source. If the manager doesn't know, the Director, Defense Security Assistance Agency can provide the information and should be consulted, through channels.

9.5 Pricing Data Items on the DD Form 1423

The DD Form 1423, Contract Data Requirements List, is used in solicitations that require delivery of data. It includes known requirements. For procurements expected to result in contracts of $100,000 or more, the offerors are asked to price each deliverable data item. However, deliverable data items are not priced when the DD Form 1423 is used for sealed bids.

The contractor will prepare certain data as a natural consequence of contract performance. Design, development, testing, and production tasks will generate certain data, whether or not you identify a requirement on the DD Form 1423 and ask for its delivery. This fact is the basis for what is called the over and above concept for pricing data: the price you pay for a data item will be based on what it costs the seller to furnish the item, over and above the costs it would incur if you did not require it at all.

The requiring activity will use the submitted prices in deciding whether its needs for the data are worth the dollars they will cost. If the activity concludes that the benefits are commensurate with the cost, the data requirement stays on the list; if the activity concludes that the data are not worth what they will cost, it modifies or deletes the requirement. The amended list is made a part of the contract. The prices on that list, how they are derived, and what they mean are the subject of this section.

Definitions

Data item is a document, drawing, report, manual, revision, technical order, or other submission entered as a specific line item on the DD Form 1423 and required to be delivered.

Data cost is the cost the contractor will incur to develop, prepare, and deliver the data item -- the cost it would not incur if the data item were not required.

Cost or pricing data is not a data item. It will not be listed on the DD Form 1423 nor will it be subject to data management procedures.

Data line item is an item in the contract schedule. Every contract that has a DD Form 1423 will also have at least one line item in the schedule entitled "data." The dollar value assigned a data line item will be the total of prices entered in Block 26 on the DD Form 1423.

Data price is the price in Block 26 on the DD Form 1423. The offeror will price, or show as N/C (no charge), each data item on the form. Prices will be direct cost and allocable indirect cost plus profit. If the preparation was required by an earlier contract or involved indirect effort only, N/C will be entered in Block 26.

Data pricing is much the same as any other pricing action. The total price of the data line item will be supported by cost or pricing data. The data will be submitted in a package topped by a completed SF 1411. The data will be analyzed and the prices negotiated. If there are a large number of data items, you won't have to get separate breakdowns for each item. You would use sampling techniques to select items for which the offeror will be required to submit cost or pricing data. You analyze the prices of selected items and negotiate as you would if the items were spare parts.

Objectives

The prime considerations that govern your actions in pricing the data items on the DD Form 1423 are:

a. The offeror's prices on this form should be realistic; they will be used to make the buy decision.

b. Apply the concept of materiality at all points in the estimating-analyzing-negotiating-cost tracking cycle; is the probable benefit worth the effort?

c. Be as concerned with unit price integrity in pricing data items as you would be in pricing spare parts, as that term is discussed in Section 9.2. Pay attention to the total price negotiation technique, as that term is discussed in Chapter 8 in the context of multi-item contracts.

d. The offeror's estimating, pricing, and cost accounting methods must be compatible.

e. You and all other Government and industry people involved in this process need to agree that the goal is reasonably accurate costs and realistic prices and not precise and detailed accounting.

Pricing method

You usually will have to use cost analysis to evaluate the data line item. If the DD Form 1423 contains a large number of data items, you probably will use the sampling technique associated with spare parts pricing. Stratification may permit you to analyze each of the major items on the list (handbooks and manuals, for example) and sample the data items of minor value.

The pricing job isn't finished when you and the offeror agree on either a total price for the data line item or prices for selected items from the total list. In either case you will adjust the prices of all the data items on the DD Form 1423 so that the total of those prices equals the data line item price on the contract. The adjusted prices become the baseline for data management review.

Changes to the data line item will come from adding, substituting, or deleting specific data items. Change also may be caused by an adjustment of the requirement of a given data item. In any event, the change should be priced in the same manner as any other contract change.

Give special thought to the pricing of the many minor data items. Indirect personnel may prepare and submit such items as reports. If so, the cost of furnishing these items would be charged to overhead. Further, companies may claim a cost adjustment any time a data item is added or deleted. If the effort involved is administrative and usually charged to overhead, adjustment probably is not warranted unless the change increases or decreases the head count of indirect personnel.

Price groups

To implement the over and above concept, we have developed four price groups, four different levels of over and above application. They are summarized in Table 9-13 and defined in the narrative.

TABLE 9-13.

GROUP	ESSENTIAL TO CONTRACT PERFORMANCE	ADDED EFFORT REQUIRED	PRICE	COST DETAIL LEVEL*
I	No	Yes (100%)	Yes	1 and 2
II	Yes	Yes	Yes	1 and 2
III	Yes	Some	Yes	2
IV	Yes	None	No	None

*In accordance with the following code and subject to limits imposed by the item, the contractor's accounting and estimating methods, and the results to be achieved.

Code

1 Cost breakdown.

2 Description of method used to price. For low value items, any reasonable method can be accepted.

Group I, data the contractor prepares to satisfy the Government. The contractor does not need this type of data to perform the rest of the contract. Price would be based on identifiable direct costs, overhead, and profit. Technical manuals prepared for Government use are an example. (Engineering drawings are generally the source material for technical manuals. The cost of developing the drawings is not a cost of producing the manuals.)

Group II, data essential to contract performance that must be reworked or amended to conform to your requirements. Price would be based on the direct cost to conform the original data to your needs and to deliver it to you, plus allocable overhead and profit. Much of the data we buy are from this group. MIL-D-1000 Form 1 drawings are examples.

Group III, data the contractor must develop for its own use and that require no substantial change to conform to your requirements regarding depth of content, format, frequency of submittal, preparation, and quality of data. In pricing data in this group, you would consider only the costs of reproducing, handling, and delivery, plus overhead and profit. An example of Group III data would be MIL-D-1000 Form 2 or 3 drawings used in the manufacturer's normal plant functions. Form 2 or 3 drawings are those drawn to company standards.

Group IV, data the contractor has developed as part of its commercial business. We don't require much of this data and the cost is insignificant. The item is coded N/C. Example: A brochure or brief manual developed for commercial application that you will acquire in small quantities; the added cost is too small to justify the expense of computing the charge that would otherwise go with the acquisition.

Analysis

Data costs can be separated into cost of development and preparation and cost of production. Development and preparation costs are largely labor costs and include research, design, drafting, illustrating, writing, typing, and reviewing the efforts. Production costs are largely material and processing costs and include -- besides materials -- printing, handling, inspection, distribution, storage, and mailing. One characteristic of these production costs is that the efforts they represent will be treated as indirect costs in many accounting systems.

Analysis starts with questions about what and how you are buying and who will do the work. You also want to know which price group (Block 25) the data belongs in and how complex the tasks are. You want to know the size and number of units for certain kinds of data and just the number of units for others. You might want or need to distinguish between text, drawings, foldouts, art, photo, computer printout, and other.

Price group is one key to evaluating the price proposed for a data item. If the contractor had to prepare the data for its own use, most of the preparation effort should have been charged to engineering or design effort and not to data preparation chargeable to the Government.

Manhours and rates should be broken into appropriate categories. Depending on the data item, you would look for the following:

a. *Engineers:* Prepare and refine source data and supervise and direct preparation and validation of the documentation.

b. *Engineering assistants:* Prepare some data, do research, make calculations, sketch, and analyze primary data.

c. *Writers:* Research, plan, schedule, and write in the data preparation stage. Also recommend illustrative material and perform liaison.

d. *Editors:* Perform whatever editing is required.

e. *Illustrators:* Do layout, sketches, studies and liaison, visualize, illustrate, detail, calculate, prepare, and incorporate revisions.

f. *Checkers:* Perform quality control and integrate the data preparation effort.

g. *Clerks:* Type, compose, prepare, and maintain records.

h. *Programmers:* Program computers.

If the data item is a Group I item, direct labor hours will represent about 75 percent of the total effort. This share drops to about 40 percent for Group II and 25 percent for Group III. These are general rules of thumb only and you must decide case-by-case on the validity of the group assignment and the reasonableness of the amounts estimated for direct effort.

Remember that the company will prepare certain data to manufacture the hardware and that this preparation time is chargeable to contract engineering or design effort and not to data. (On the other hand, the effort necessary to revise contents and formats to meet Government requirements is chargeable as data cost.) The basic engineering documentation required for manufacture also is used for configuration management, reliability, maintainability, quality control, and other functions that also produce data frequently required by the Government.

Other expenses that you may find in estimated costs of data are those having to do with machine time, travel and subsistence, and reproduction expenses. Machine and computer time generally is required for and associated with spare parts provisioning documentation. Look for hours and rate per hour for keypunch, tab, printer, computer, and rented equipment. Travel and subsistence expenses usually are incurred when testing is required or when data preparation is performed at several locations or is subcontracted. Reproduction expenses should be identified by the method to be used (Xerox, multilith, Itek masters, Ozalid, microfilm, and similar processes). The number of copies and the number of units, and cost for each, for text, halftones, art, foldouts, photos, covers, and the rest also should be identified.

Examples

To put the cap on this discussion, let's look at four data items, one in each of the four price groupings. The first is a maintenance manual (Group I) at a price of $163,346, including changes. The second is engineering data (Group II) at $19,767. The third is preservation and packaging data (Group III) at $1,232, and the fourth is a parts list (Group IV) at no charge (N/C).

1. **Maintenance Manual** (Sequence No. 0001) -- $163,346.

This is generally the most expensive category of data because the direct effort is expended solely to meet the Government's requirements. The two principal tasks are to prepare the text (the manuscript) and the illustrations, but there are obviously other tasks and costs as well.

Assume that a manual of average complexity with 200 pages of illustrations will meet the requirement. Assume that changes will take 80 pages, half text and half illustrations. The estimate breaks down as shown in Table 9-14 and individual elements are explained in paragraphs *a* through *g* that follow.

TABLE 9-14.

Engineering	$ 1,880
Writing	6,720
Editing	1,232
Art work	26,000
Printing	50,000
Overhead	57,664
Subtotal	$ 143,496
G&A	11,480
Total Cost	$ 154,976
Profit	15,498
Price	$ 170,474

a. *Engineering -- $1,880.* The engineers decide what should go in the manual. The contractor estimates 188 hours at $10 per hour.

b. *Writing -- $6,720.* The technical writers turn the engineers' plans for the manual into text. This effort is estimated to take 672 hours at $10 per hour.

c. *Editing -- $1,232.* It will take 154 hours at $8 to edit the manuscript. 600 hours will be needed for typing and other clerical tasks, but this cost, under the contractor's accounting system, is charged to engineering overhead.

d. *Art work -- $26,000.* Draftsmen, artists, photographers, and similar skills are needed. The total estimate is made up of what is shown in Table 9-15.

TABLE 9-15.

Draftsmen, 2,000 hours @ $8	$16,000
Artists, 80 hours -- in overhead	--------------
Photographers, 80 hours -- in overhead	--------------
Photo processing	10,000*

*Subcontract, Fast Pic Processors, after competition.

e. *Printing -- $50,000.* With permission from the Public Printer, 500 copies of the manual will be printed by McDougald Press, Inc. The subcontract is for $50,000. Shipping costs, postage, and other efforts are a part of overhead.

f. *Overhead -- $57,664.* The cost of the space where the work will be done (heat, light, power, building depreciation, and maintenance, for instance) and the cost of machines and equipment (drawing boards and typewriters, for instance) are included in engineering overhead. The direct efforts must carry a portion of this expense that is allocated at a rate of 200 percent as shown in Table 9-16. The costs of purchasing, subcontract follow-up, receiving, and storage are collected in a special material overhead pool and each subcontract bears a proportionate share of the cost. The current rate, shown in Table 9-17, is 10 percent.

TABLE 9-16.

Engineers -- $1,880 x 200%	$ 3,760
Writers -- $6,720 x 200%	13,440
Editors -- $1,232 x 200%	2,464
Draftsmen -- $16,000 x 200%	32,000
Engineering overhead	$51,664

TABLE 9-17.

Fast Pic Processors $10,000 @ 10%	$ 1,000
McDougald Press $50,000 @ 10%	5,000
Material overhead	$ 6,000
Engineering overhead	51,664
Total overhead	$57,664

g. *G&A -- $11,480*. General and administrative expenses are prorated to all contract costs. Current rate is 8 percent.

2. **Engineering drawings** (Sequence No. 0002) -- $19,767.

This is a Group II item. The drawings were prepared so that the contract end-item could be manufactured. The cost of developing the drawings is part of the cost of engineering and, depending on the contractor's accounting system, they are either costed directly or as a component of overhead. The figure of $19,767 represents the estimated cost of redrawing to Government specifications and includes the cost of draftsmen and checkers as well as the cost of reproducing and delivering the redrawn data. It also includes a portion of allocable overhead and G&A and an amount for profit.

3. **Preservation & packaging data** (Sequence No. 0003) -- $1,232.

You need this to preserve the item so that it will not deteriorate and to pack and crate it for reshipment. The contractor will have to prepare the instructions for its own use and what you want are copies, of a special size and under a special cover, for use by Government packaging specialists. The only costs are the added ones relating to your special requirements, plus the costs of reproducing and shipping. You want to know how the contractor estimated the $1,232 figure, because most of the effort to meet your requirement is of the sort usually charged to an overhead account. Because the special covers and shipping costs would not be necessary if you didn't want the data, the contractor should be able to charge those costs directly to the contract.

4. **Parts list** (Sequence No. 0004) -- N/C.

This Group IV item is a list of parts making up the end-item. You want five copies and you don't need a special format. The contractor probably has the data on computer tape and you will be happy with the printout copies. If you later decide you don't want the lists, there would be no noticeable reduction in cost. Even though some costs are involved, they are indirect in nature and the amount is so insignificant as to be lost in the total of the overhead pool. However, insignificant or not, if you want a data item, it has to be on the DD Form 1423.

Suggested Readings

Catalog or Market Price Exemption

FAR	15.804-3(c)	Established catalog or market prices
DFARS	15.804-3(c)(6) and (7)	
FAR	15.804-3(e)	Claiming and granting exemption
DFARS	15.804-3(e)(3)	

Spare Parts

FAR	15.812	Unit prices

Warranties

FAR	Subpart 46.7	Warranties
DFARS	Subpart 46.7	Warranties

Foreign Military Sales

DFARS	Subpart 25.73	Acquisitions for Foreign Military Sales

Pricing Data Items

DFARS 15.871	Estimating Data Prices (DD Form 1423)

CHAPTER 10
Postaward
Pricing Actions

CHAPTER 10

POSTAWARD PRICING ACTIONS

CONTENTS

10.1 Contract Changes 10- 2
  Change orders 10- 2
  Equitable adjustments 10- 3
  Pricing of changes 10- 5

10.2 Interim Pricing 10- 9
  Forward pricing factors 10- 9
  Final overhead rates 10-10
  Option pricing 10-11
  Interim price adjustments 10-12
  Defective pricing 10-13

10.3 Final Pricing 10-15
  Final pricing of fixed-price arrangements 10-16
  Residual inventory 10-17
  Termination inventory 10-18
  Termination pricing 10-21

10.4 Miscellaneous 10-24
  Cost acounting standards 10-24
  Monitoring indirect costs 10-27
  Support to cost estimating 10-27

The award of a contract does not signal the end of pricing activity, even though most of this manual and much of FAR and DFARS pricing coverage concentrates on the preaward phase of procurement. In fact, it can be argued that the really tough pricing work comes after award.

Real or potential competition existing before selection and award disappears when the contract is signed. The competing offeror becomes a sole source contractor. Instead of working with estimates of future activity, the contracting team is soon working with imperfectly measured actual costs to date plus estimates to complete. The actuals are made more difficult to work with intelligently by the imprecision of cost accounting and the difficulty of measuring ongoing work in process.

Instead of measuring costs against standards of reasonableness, necessity, and allowability and adjusting the estimate as appropriate, the contracting team may have to convince the contractor, who has already spent the money, that it shouldn't have done so. Disallowance of incurred costs becomes a present reality; it can no longer be viewed in the abstract. One of the real differences, and a potential source of misunderstanding, is the fact that much of the postaward pricing activity may be done by people in contract administration who were only advisors before the award.

Chapter 10 has four sections: contract changes, interim pricing, final pricing, and miscellaneous. Any overlap is intentional.

Contract changes, which could be included as interim actions, are actions that are permitted by contract terms but rarely are covered in the initial price. They may alter the specifications and the scope of contract work as priced originally and, as a result, present unique problems.

Interim pricing includes actions contemplated from the outset that are contingent upon either the happening of an event or the passage of time. Interim pricing also includes forward pricing rate agreements, an administrative convenience that may affect individual interim pricing actions. The method for determining annual overhead is described.

Final pricing includes the actions taken to bring the contract to a close. The section highlights contract close-outs, settling incentive contracts, handling residual inventory, and pricing termination settlements. The last section includes *miscellaneous pricing actions* that occur from time to time because of legal requirements, contractor actions, or requirements of functional managers like the comptroller.

Postaward actions require techniques and concepts explained in other chapters of this manual, but the considerations and the environment are usually different. To the extent possible we will discuss only the unique aspects of postaward actions.

10.1 Contract Changes

Contract changes are, as the name implies, alterations of some part or parts of the terms and conditions of an existing agreement between the Government and a contractor. Often the instrument that changes the contract formalizes an action precipitated by a change order or other document directing or authorizing the change, with adjustment of the contract to follow.

Before assuming that contract performance can be changed, examine the Changes clause in the contract. The Changes clause is used to order changes within the general scope of the contract in one or more areas of contract performance spelled out in the clause.

Whenever possible, you and the contractor agree upon any increase or decrease in contract price before you authorize or direct the contractor to make a change. However, if time does not permit or if you can't reach agreement on a reasonable adjustment, you may order the change, and later determine the amount of increase or decrease caused by the change.

No matter how the change is initiated, the pricing task is the same. Your job is to come up with an equitable adjustment to the contract price if the change affects the cost of contract performance. Nevertheless, you need to understand the contractual basis for a change in order to appreciate the complexities of the pricing task. For that reason we will discuss change orders as a common means for directing a change to a contract.

Change orders

The change order is a unilateral action authorized by the Changes clause of the contract. Changes orders are issued by the contracting officer, with or without the consent of the contractor, and must be in writing. The Changes clause specifies that there will be an equitable adjustment in the contract if the change involves an increase or a decrease in the cost of or time for performance of any part of the work under the contract. The contractor is required to comply with the change order and proceed with the work, pending the outcome of negotiations to establish the equitable adjustment.

For instance, the Changes clause for fixed-price contracts may be used to order changes to drawings, designs, or specifications, where the supplies to be furnished are to be manufactured for the Government in accordance with them. You also may order a change to the method of shipment or packing or to the place of delivery under the changes clause. Whatever rights the Government has to issue a change order are limited to those specified in the Changes clause of the contract.

A decrease in quantity is made under the termination for convenience clause of a contract. Quantity increases generally constitute new procurement, are not obtained under the Changes clause, and are subject to the requirements and controls applicable to any new procurement.

Equitable adjustments

The equitable adjustment is the settlement with the contractor for the effects of a change. It generally involves price, or estimated cost plus fee, and delivery schedule. It may also involve other provisions of the contract affected by the change, but these tend to be less troublesome than the adjustment of price. Therefore, we will limit this discussion to the pricing aspects of equitable adjustments.

An equitable adjustment may be upward or downward, depending upon the effect of the change. The nature of the contract effort, that is, research, development, production, construction, maintenance and repair, or support service, affects the environment in which the change will be priced. It affects your ability to estimate fair and reasonable costs and to determine the cost of work that will be altered by a change and the cost of work that will be deleted. To establish a sound pricing position, you must know the technical requirements and the technical differences introduced by a change.

There is no formula for pricing a contract change. You should price each change based on its own requirements. The scope of analysis and the time it takes depends on the amount and complexity of the changed work, the degree of redesign and testing required, the nature of the work deleted or made obsolete by the change, the contractor's cost experience up to the change, the quality of the contractor's estimating methods, the volume of changes to the contract, and the nature of the contract pricing arrangement. You need to know how the contractor generally estimates changes and what facts were used to estimate the change you are looking at.

Pricing Changes under CPFF Arrangements

The Changes clause in cost-reimbursement arrangements usually provides for an equitable adjustment in estimated cost or delivery schedule, the amount of fixed fee, and any other provisions affected by the change. Any adjustment to estimated costs should be as realistic as possible to maintain the estimate as a standard against which to measure expenditures. Fee adjustments must take into account the particular circumstances of the change, its complexity, the effect on estimated costs, and the time of submission of the change proposal in relation to performance of the work required by the change.

Pricing Changes under Incentive Arrangements

One overriding consideration in pricing changes to incentive arrangements is to preserve the incentive arrangement of the basic contract and retain the balance between incentive objectives in the original provisions. For FPI arrangements it will be necessary to determine the effects on target cost, target profit, share, and ceiling price, and for CPIF arrangements, target cost and minimum, target, and maximum fees. Contracts with performance incentives create still greater interdependence.

Disruptive Effect on Unchanged Work

A change under the Changes clause may affect the cost or schedule of two different classes of work: the work changed, and the balance of the contract work that is not changed. The work not changed may be affected by the need to make substantial revisions to plant scheduling of equipment, the flow of work and manufacturing routines may be disrupted, or efficiency and learning may be reduced substantially. Any of these effects could increase contract costs.

The contractor is expected to work around a change as efficiently as possible, and may be able to reduce the impact of the change substantially. In any event, these effects on unchanged work are difficult to measure, and the claim is difficult to document. Consequently, you must analyze the estimate of this effect carefully, getting explanations from the contractor for each aspect of the claim.

Disputes

If you cannot agree with the contractor on the price of a change, you may have to use the procedures of the Disputes clause of the contract. That clause provides that the contracting officer will initially decide "any dispute concerning a question of fact arising under the contract." Failure to agree to a price adjustment resulting from a change normally is considered to be a dispute concerning a question of fact. The contractor is not excused from the responsibility to proceed with the contract, as changed, pending a final decision of the dispute.

A contracting officer who cannot reach agreement with the contractor on the price of a change will make a unilateral determination of an equitable price, put this decision in writing, and send it to the contractor. The contractor may, at its option, file a notice of appeal. Appeals are heard by the Armed Services Board of Contract Appeals (ASBCA). When you prepare your analysis of a proposed change and develop the negotiation objective, keep in mind that the thoroughness and logic of your efforts will have a real bearing on the strength of the Government's position and the likelihood that the Government's position will be sustained if there is an appeal.

Constructive changes

These are also called "changes by implication" and occur when the Government, by its actions, changes a contract without going through prescribed procedures. A constructive change is an oral or written act or omission by the contracting officer or other authorized Government official which is of such a nature that it is construed to have the same effect as a written change order.

The concept of constructive changes is well established in Government contract law. Appeals boards have found that an informal requirement for performance of additional work is equivalent, substantively, to a formal requirement and must be governed by similar principles.

Erroneous interpretations by the contracting officer or the contracting officer's representative may lead to actions that constitute constructive changes. An interpretation of the contract language by the contracting officer, either voluntarily or at the request of the contractor, may be construed as a change if the interpretation calls for something more than the contract specification requires. The insistence of a quality control representative that the contractor perform to a higher standard than called for by the contract specification has been held to be a change; the quality control representative was considered to have acted as a representative of the contracting officer.

Defective specifications may lead to a finding of constructive change on the basis that the defect should have been corrected by a formal change. There is an implied warranty by the Government that if the specifications are followed the item produced will meet the contract performance requirements. Specifications may be considered defective because of simple error, inadequate detail, practical impossibility of performance, or a combination of these factors.

Because only the contracting officer or an authorized representative can issue change orders, most constructive changes can be avoided if other individuals are alert to the implications of their actions. Any question of action or inaction constituting a change should be discussed with the contracting officer as soon as possible.

Pricing of changes

Value of Changed Work

The dollar value of any change is the difference between the article or work deleted and the article or work added. Basic analytical techniques and procedures should be used to evaluate the estimated costs of the new work, the estimated direct costs of changing over from old to new, and the actual and estimated costs of the article or work deleted.

You figure cost of work deleted by estimating the cost as of the time the change is to be made. If some costs have been incurred, include them in your computations. This approach does not upset the actual cost/profit relationship existing at the time of the change. It relates profit to the quality of the job done by the contractor in controlling costs, designing and manufacturing, and making deliveries. The following examples illustrate the proper method of pricing changes.

Example 1: Part A is to be replaced by Part B, effective with the 11th of 20 units. Both parts are manufactured and installed by the contractor. Based on original estimates, the unit cost for the last 10 units of Part A would have averaged $100. However, current actuals, projected for the last 10 units, indicate an average unit cost of $125. Ten units of Part B are estimated to cost $200 each (see Table 10-1).

TABLE 10-1

Estimated unit cost, Part B	$200
Less: estimated unit cost, Part A	125
Unit cost of change	$ 75

Example 2: The situation is the same as in Example 1, except that the latest projection for the last 10 units of Part A is an average unit cost of $90(see Table 10-2).

TABLE 10-2

Estimated unit cost, Part B	$200
Less: estimated unit cost, Part A	90
Unit cost of change	$110

Example 3: The situation is the same as in Example 1, except that the average unit cost for 10 units of Part B is estimated at $75 (See Table 10-3).

TABLE 10-3

Estimated unit cost, Part B	$ 75
Less: estimated unit cost, Part A	125
Unit cost of change	$ 50 credit

Example 4: The situation is the same as in Example 3, except that the latest projection for the last 10 units of Part A is an average unit cost of $90 (see Table 10-4).

TABLE 10-4

Estimated unit cost, Part B	$ 75
Less: estimated unit cost, Part A	90
Unit cost of change	$ 15 credit

When you are buying in quantity, the estimated cost of new work is likely to include both recurring and nonrecurring efforts. You should separate the two types for analysis and negotiation.

Recurring costs represent the continuing direct costs of doing the new work. It may be comparatively easy to estimate recurring costs, and they may not be significantly large, at least on a unit basis. However, it often is difficult and rarely worthwhile to segregate the actual costs of new work from the continuing cost of old work in the accounting records.

Nonrecurring costs may be segregated, however, and if they can be segregated and are significant in amount, they should be. Nonrecurring costs may include redesign, drawing, tooling, rearrangement, and setup efforts needed to engineer the change and incorporate it into existing production processes. They also may include the cost of disposing of any property made obsolete or excess as a result of the change. Nonrecurring costs should have well-defined beginning and ending points. If they do, they can be set up on a work order and the actual costs can be tracked and controlled.

By separating nonrecurring costs from recurring costs in analysis and negotiation, you get a better picture of the real cost of a change. The contractor who sets up a work order for nonrecurring costs can do a better job later in controlling costs and you can do better in pricing later changes, identifying and fixing responsibility for cost growth, and, if the contract is FPI, negotiating a reasonable final cost figure.

To summarize, the cost of the article or work deleted should approximate the estimated cost for the article or work at the time the change is made. Although the examples concern a change where one part is substituted for another, the same principle applies to delivery acceleration, stretch-out, or any other type of contract modification. In addition, because the dollar value of any change will be determined by negotiation with the contractor, the tests of reasonableness and equity will always guide.

Procedures

When analysis and negotiation of contract changes is a volume operation, controls and standard procedures are required. The ACO should keep a log to show engineering change proposals and contract change notifications outstanding and on hand. Just as with spare parts, the ACO should agree with the contractor on procedures for pricing changes, making sure that the principal PCOs know about the program and are brought into the negotiations or otherwise accept the agreement. Estimating procedures used by the contractor should be a matter of record; so should the pricing factors. The factors, such as rates for labor, indirect costs, and material handling, should be negotiated after a review of the contractor's forecast of operations for the future period. The rates also should be subject to periodic review and adjustment; in fact, they may be the same factors used to price spare parts and smaller orders.

Because of the volume of change orders, pricing reports may be a problem. Nevertheless, it is necessary to convey to the contracting officer, for review and approval, a record of what was analyzed and what the results were. The following is one way to do this:

a. Write a memo describing the contractor's pricing procedures and the methods Government personnel use to evaluate change order prices.

b. Discuss this memo with the contracting officers doing the most business with the contractor.

c. Negotiate and periodically update pricing factors.

d. Write memos of these negotiations.

With these documents on file with principal buying offices, the report of analysis of an individual change may be limited to a statement about the contractor's use of negotiated pricing factors and standard estimating methods, with specific comments only on those portions of the estimate that are peculiar to the individual change. The portions of the estimate peculiar to the change would be items like the quantitative factors of labor and material and the nonrecurring costs. Standard evaluation methods or negotiated pricing factors will not always be used; where deviation from these methods or factors occurs, a regular, complete report of analysis is required.

Cost or pricing data are to be submitted and a certificate is to be executed on contract modifications when the total, aggregate additive and deductive costs are expected to exceed $100,000. (A $90,000 addition and a $20,000 deduction is a $110,00 change.) When pricing engineering changes, changes in delivery schedules, or other similar modifications to work already on contract, the contracting officer will have to get a cost proposal and cost or pricing data from the contractor; we know of no other way to evaluate such a change.

Quite possibly, the change can be evaluated on the basis of a limited (less than complete) cost analysis, but small benefit may accrue from this self-denial. Because costs are vital to the analysis of a change proposal, the data that shape your price decision should be complete, accurate, and current. To demonstrate that proposed dollars are not reliable indicators of the need for cost or pricing data, consider that a contractor might be tempted to underestimate the impact of a change that would reduce the cost of contract performance.

Timeliness

Contract modifications rarely are priced before the work is done. Much of this circumstance traces from the number of changes that have to be priced. Because of this, the effort can be made more timely if the volume of changes to be priced can be reduced. Self control on the part of both contractor and Government personnel is one way of reducing volume. However, even assuming that every contract change is essential, a large number would remain whose dollar impact, individually and in total, would be insignificant compared to the value of the contract itself.

With this the case, numbers can be reduced without sacrificing dollars or principles, and time can be spent working at pricing those changes carrying significant dollars. You can do this by such means as:

a. Including in a production contract a clause, often called the 1 percent clause, which provides that changes will be incorporated into the contract without changing the contract price as long as the cumulative value of the changes does not exceed plus or minus 1 percent of the contract price. Thereafter, the effect of each change is priced into the contract. This sort of clause could be tailored to provide that both recurring and nonrecurring costs would be included in computing the cost of the change, or it could provide for recurring costs only. Further, there is no magic in the 1 percent; in some situations, a larger figure may be reasonable.

b. Specifying that any change within a specified dollar figure, plus or minus, will be incorporated at no change in contract price. The Changes clause of one contract contains the provision that any change, the estimated cost of which does not exceed $100,000, is included in the initial contract price.

We have two comments concerning these approaches to controlling the number of change actions.

a. Don't negotiate a specific amount to be included in price to cover this changes item. There are both debits and credits involved and, for these relatively minor changes, they tend to offset. Second, the contractor usually cannot keep the actual cost of changes segregated. This means that when you use current actual costs as a basis for projecting the future costs of your contract, you may include, in effect, a change factor in your forecast.

b. You will need to analyze these relatively minor changes to be sure that there is a cost, or only a minor credit, involved and, when the cumulative total nears the preset limit, to make sure of the costs already counted into the total.

Ceiling Prices

Unpriced change orders are risky. As just noted, it usually takes time to price out modifications. During that time, an unpriced change order is much the same as a letter contract in terms of the lack of cost restraints on the contractor. As a consequence, agreement should be reached with the contractor on the price of a major change before the contractor is ordered to proceed. If the change cannot be priced before it must be authorized, agreement should be reached with the contractor on a ceiling, a not-to-exceed price for the change. A change without any price restraint should be authorized only when it is clearly impractical to do otherwise.

No-Cost Changes

For those changes that develop a relatively small increase or decrease in price, it is common practice to incorporate on a no change in contract cost basis. This practice is encouraged because of the administrative costs involved under the alternate treatment. However, you first should review the change proposal to provide reasonable assurance that deletions and additions under the particular change are, in fact, either virtual stand-offs or within a prescribed dollar value agreed to by the parties.

Revision of Delivery Schedules

Revisions in delivery schedules may result from program changes that affect quantities (increase or decrease) or time (acceleration or stretch-out). Such a revision must not become a vehicle for reopening the price of the entire procurement. The contractor who, prior to the schedule revision, has been able to perform at a cost less than originally estimated is entitled to a continuance of that favorable cost/profit relationship. Similarly, if the contractor has failed to control cost, the existing unfavorable cost/profit relationship should not be wiped out by schedule revision.

It is hard to generalize on the probable effect of a revision in schedule because changes are made under varying conditions and result in varying cost impacts. In a schedule extension, the contractor may argue that the project must absorb more overhead because additional months are needed to complete the contract. This estimating approach, based on the concept of period costs, may be appropriate in some cases, but not in others.

If the project represents a relatively small part of the contractor's total volume, and if the work requires a normal balance of regular shop skills, the effect on overhead and the resulting adjustment of the overhead estimate should be negligible. If, however, the contract represents a major part of the contractor's volume, a substantial increase in the overhead estimate could be appropriate. Because of the nature of its component elements, the overhead rate can fluctuate significantly with changes in volume.

In addition to overhead, analysis of a schedule revision should include available tooling, methods of production, and learning as these affect direct labor hours. Extending or accelerating deliveries may require changes in machines, processes, or layout, and require new or different tooling, which in turn may retard or increase learning.

Always find out what caused the schedule change. The contractor who is in a delinquent position is responsible for any increase in cost that would have occurred under the schedule or that is estimated to occur under the new schedule.

Profit on Changes to Correct Deficiencies

When a deficiency in the contractor's design or performance makes a change necessary, an incentive approach should be invoked. Because good performance is rewarded with increased profits, demonstrably poor performance should result in a reduction in profit.

The first step must be to determine whether the contractor should bear the cost of the change wholly or in part. If responsibility is fixed with the contractor and the change is negotiated so the contractor bears at least a significant part of its attendant cost, the question of profit reduction becomes academic. If responsibility is shared in such a way that it is reasonable for the Government to pay all or a significant part of the cost of the change, the figure agreed to should include little or no provision for profit.

10.2 Interim Pricing

This section discusses several kinds of pricing actions that take place during contract performance. Two can be classified as administrative actions, which, by their nature, touch many contracts. These are forward pricing factors and overhead rates. The others are specific actions provided for in contract clauses. These include option pricing, adjustment of flexible price contracts, and defective pricing.

Forward pricing factors

As a matter of administrative convenience, you may enter into agreement with a contractor on the cost factors to use in pricing during a specified period of time. The factors may include indirect cost rates, labor hour rates, material and labor variances, material handling rates, efficiency factors, or allowances for obsolescence. The exact factors in the agreement will depend on the contractor's estimating and accounting practices.

The rationale for entering into agreement is that a contractor who has, or anticipates having, a significant amount of Government business (new proposals, change orders, spare parts) will have some system for pricing that business. The accounting department, for example, may give the sales department pricing factors to use in preparing proposals. If the contractor repeatedly uses these factors on proposed actions that will ultimately be analyzed by Government personnel, the Government can save time and resources if it reviews the factors and negotiates an advance agreement covering their use.

There are several considerations that may influence your decision to use forward pricing rates and, if the decision is affirmative, that influence the specifics of the agreement. There must be a relatively high volume of pricing actions prepared by the contractor and reviewed by the Government. All Government agencies doing significant amounts of business with the contractor should agree to the conditions under which the rates will be used. The period over which the agreement is effective should be long enough to justify the administrative effort but not so long as to create an unacceptable risk. In addition to time, the nature, type, and diversity of operations and the product mix will bear on the terms of the agreement. Finally, you must consider the reliability of cost accounting data and cost estimating practices.

The ACO must monitor the agreement to determine whether present conditions or intervening events negate the current applicability of any cost factors. Changes in business volume, changes in market conditions affecting material or labor costs, savings accruing from cost reduction programs, and changes in the accounting treatment of direct and indirect costs are things to look for.

When an overhead monitoring program is operating at the contractor's plant, a forward pricing rate agreement, based on accepted budgets, is a logical by-product. The monitoring team reviews budget preparation, volume forecasts, and the resulting budgets. They track actual costs against the budgets and analyze variances. They report significant events to major buying and program offices. It should take little added effort to agree on forward pricing rates. In addition, the rates are monitored continuously and can be modified if rates and factors become unrealistic.

Final overhead rates

Final rates are established by auditor determination procedures. Under those procedures, the auditor receives the final rate proposal, audits it, and seeks the contractor's agreement on the findings. Final rates are normally established at the end of a regularly stated period. In certain cases, and only for educational institutions, they may be predetermined, that is, established for a future period of contract performance.

Billing Rates

The contract may include temporary overhead rates for interim reimbursement purposes or, in other cases, the contractor and the auditor may agree upon rates for this purpose. These billing rates are intended to provide interim reimbursement in amounts close to what the final overhead will be. The rates are reviewed from time to time during the period to make sure the payments are close to actual expenditures. If they are over or under in significant amount, they are adjusted.

Auditor Determination

The auditor obtains an indirect cost proposal from the contractor as soon as possible after the close of the contractor's fiscal year, and performs or completes the audit of indirect costs for that year.

In order to expedite the process, the auditor doesn't wait until the audit is finished to complete findings on individual items of cost. The auditor discusses each item to be recommended for disapproval, first with the contractor and then, where appropriate, with the ACO. The auditor does this as each such item is disclosed during the audit.

After completion of the audit and preliminary discussions with the contractor, the auditor prepares a proposed agreement and explanation of the disapproval of any portion of indirect costs. If the contractor accepts the auditor's rate determination, the auditor will get a written agreement. If the contractor does not concur, the auditor issues the appropriate notices of costs suspended and/or disapproved on the remaining questioned items of costs.

The contractor who does not concur in disallowances taken by the auditor may go to the ACO for review and final decision. If the contractor does not agree with the ACO's decision, it may submit a claim and appeal the decision to the Armed Services Board of Contract Appeals (ASBCA) or the claims court.

Contracts with educational institutions may provide for use of predetermined fixed rates or negotiated fixed rates with carry-forward provisions. In both cases, the rate negotiated is firm for the period. The predetermined rate is based on the expected costs for the future period, as is the negotiated fixed rate, but the negotiated fixed rate, after the first year, may include an adjustment for over- or under-recovery of indirect costs in the preceding period.

In both cases, the institution submits a proposal and the auditor examines it and issues an advisory report to the contracting officer for use in negotiating the rates and, if applicable, the carry-forward adjustment.

Option pricing

An option clause is a contract provision that permits the Government, for a specified time, either to purchase additional quantities of the supplies or services called for by the contract or to extend the period of contract performance. The use of options introduces complications in evaluating bids or proposals and pricing option quantities.

The solicitation may specify that option quantities will be offered at prices no higher than those for the initial quantities, or it may not impose any limitation as to price. The solicitation must state the basis for the evaluation of bids or proposals. For example:

a. It may specify that evaluation will be on the basis of the quantity to be awarded exclusive of the option quantity. This is the usual provision in option arrangements.

b. If the Government expects to exercise the option at the time of awarding the contract, it may specify that evaluation will be based on the total price for both basic and option quantities.

c. If a fixed-price arrangement is to be used, if there is reasonable certainty that the option quantity will be procured, and certain requirements are met, the solicitation may state that the option quantity will be considered in evaluation for award. However, evaluation of options does not obligate the Government to exercise the option or options.

If the option clause contains either a firm or a not-to-exceed price, it may be referred to as a *hard* option. If it merely provides that prices will be negotiated later, before the option is exercised, it may be called a *soft* option. In either event, the contracting officer must notify the contractor in writing, within a specified time, of the intention to exercise the option. If the contract provides for economic price adjustment and the contractor has requested adjustment, the effect on the option prices must be determined before the option can be exercised.

The option should be exercised only if it is the most advantageous way to meet the Government's need, price and other factors considered. The contracting officer makes that determination on price after testing the market. Accordingly, the determination that exercise of the option will be most advantageous to the Government is based on informal investigation of prices and the market. It follows consideration of such factors as the stability of the market and an evaluation of the time since contract award or a comparison with established prices that clearly indicates that neither sealed bidding nor informal solicitation would serve a useful purpose. New proposals are solicited from potential suppliers only when the contracting officer anticipates that the option price can be beaten.

If the option is a *soft* option, the contracting officer may request a proposal from the contractor, analyze it as if it were a new procurement, using field pricing assistance if needed, negotiate an agreement, and exercise the option. On the other hand, the contracting officer may solicit proposals from the contractor and from other potential suppliers for the option quantity. The contracting officer also can use this alternative if the contractor will not agree to a satisfactory price for the option quantity.

The decision about the most advantageous action will be based on other factors in addition to price. For example, the contracting officer should take into account the need for continuous operations and the potential cost of disrupting operations and relocating necessary Government-furnished equipment and inventories, as in the case of certain service contracts.

Interim price adjustments

Some fixed-price contracts can be described as flexible pricing arrangements that provide for establishing firm prices for products at some point or points during contract performance. These arrangements are used when it is not possible to establish acceptable prices for the total contract effort until some time after the contract has been awarded and performance is under way. One calls for prospective adjustment of price at a stated time or times during performance. The other arrangement calls for conversion of an initial, tentative price to either a firm fixed-price or a fixed-price incentive arrangement at a time relatively early in performance. Both arrangements have been described in Chapter 1.

We will talk a little about the mechanics of converting to a firm contract, but we will look mostly at the job of pricing future deliveries when a significant amount of costs have been incurred and additional costs have been committed in subcontracts, purchase orders, completed work in inventory, and work still in process.

Both types of flexible arrangements are alike in that the product of the interim pricing action is a firm arrangement. For one, it will be a firm fixed-price arrangement. For the other, it may be either a firm fixed-price or a fixed-price incentive arrangement. They are different in that in the first arrangement, the price relates to future deliveries only; in the second arrangement, the price is for all deliveries, past as well as future.

In both cases, the dominant need is for an accurate statement of costs to date, identified with units of completed work. You need to identify nonrecurring costs separately and work in process inventory in terms of costs for equivalent units. To be useful in estimating costs of producing and delivering a quantity of a product, actual costs need to be expressed as unit costs. Because it is not always possible to get the cost for each unit produced, average cost per lot is an acceptable alternative.

Assuming you have adequate unit cost data, your next step is to analyze the data to decide if the units should have cost what they did cost. After you have identified the questionable costs, (loosely referred to as inefficiencies), established the number of people as well as number of hours needed, stripped the costs of processes and functions that do not contribute to performance of the contract and isolated the known engineering and production problems still to be solved, you are ready to forecast the cost of undelivered items.

When the price will apply to items to be delivered in the next period of time, you must consider the cost of work in process; much of the actual work on those items will have been completed. If the final items to be delivered on the contract are also the last items on the program, you need to be sensitive to two additional factors. The contractor may forecast certain inefficiencies and one-time costs at the tag end of the effort. While these may be realistic and reasonable, you need to challenge the assumptions.

The other factor is the other side of the same coin. Because it is the end of a program, the contractor, for sound reasons, may elect to complete parts fabrication and assembly, at least at the subsystem level, at a faster rate than warranted by the delivery schedules. If so, the costs may be lower and will quite often at least offset the inefficiencies expected to result from program phaseout.

When the price will apply to all items on the contract, you will be asked by the contractor to include all actual costs to date in your estimate of total contract cost. This would include any costs you subsequently judge to be higher than they should have been. Unless you can establish clearly and beyond question that the costs were unreasonable and resulted from gross error, you probably will not be able to sustain exclusion of the cost of work completed. However, you must purge that kind of cost from your forecast of work yet to be performed.

The conversion of the initial targets of an incentive contract to a firm fixed-price or incentive arrangement must take place as early as possible in contract performance. Ideally, it should occur before the first unit has been delivered. The basic pricing concerns remain as we have described them, but the fact that the initial target cost, target profit, and incentive share arrangement can be changed in the interim price negotiation creates a special consideration.

The initial incentive contract usually is converted to a firm incentive arrangement. The firm target cost is the product of your skill at analysis. The firm target profit is the product of the relationship between the initial and the firm target costs and the application of the initial share arrangement. The ceiling price established in the original contract cannot be increased, except as the result of new work or changes made pursuant to the Changes clause in the contract. It can be lowered, however, if the situation warrants. The ceiling price at firm-up should reflect the degree of uncertainty about future costs and future work. If the spread between the firm target and the initial ceiling more than covers the remaining uncertainties, it should be reduced.

Defective pricing

P.L. 87-653 addresses itself to obtaining cost or pricing data that is accurate, complete, and current. It also is concerned with what to do if the contractor or subcontractor hasn't done what it certifies it has done. The law says that "the price to the Government, including profit or fee, shall be adjusted to exclude any significant sums by which it may be determined by the head of the agency that such price was increased because the contractor or any subcontractor required to furnish such a certificate, furnished cost or pricing data which. . .was inaccurate, incomplete, or noncurrent."

Your main concern has to be with the first part of the equation: getting accurate, complete, and current cost or pricing data, certified to by the offeror. If you get the data, use it skillfully, and write an acceptable price negotiation memorandum, you will have done your job, even if it later develops that because of the contractor's action some of the data were inaccurate, incomplete, or not current.

Things being the way they are, you have to expect that sooner or later one of your contracts will come down with a case of defective data. You will probably learn this from an auditor, either one with DCAA or one with GAO. If it is the DCAA, the auditor may be replying to your earlier request for a review of the data. If you didn't request one, the auditor would be reporting the findings of a postaward review undertaken as part of a DoD-wide program assigned to DCAA. If it is the GAO auditor who reports the suspected defective data, this will be a result of GAO's regular audit program and you will respond to such a report in accordance with procedures laid down for processing GAO reports. For this reason, we will restrict the rest of this discussion to DCAA postaward audit activity.

In any case, whether you have asked for the audit or whether DCAA has conducted one on its own, you still will have to review the facts and decide if the data were defective, whether a refund is due the Government, and how much that refund should be.

Before discussing what to do with a report of defective pricing data, however, let's look at why you might have asked for an audit in the first place. Regulations say you should ask for one whenever you have information that leads you to believe the data were defective or when the circumstances were such that you do not believe the data were verified sufficiently at the time of negotiation. By the very nature of things, you would rarely ask DCAA to make an audit; you are not supposed to award a contract until you have agreed on a price that is fair and reasonable. Therefore, the circumstances that would prompt you to make a request would be unusual.

One reason for a request might be that later negotiations with the same company reveal developments significantly different from what they were represented to be in the earlier negotiation. For instance, you are negotiating to buy an additional quantity of the same item. It is five months since the last negotiation. At that time you argued long over the projection of 150 man-hours per unit, but you finally decided that this was realistic. In the current negotiations the company has used 70 man-hours per unit, with no significant change in estimated material costs. Here, at the least, is a question that might lead you to ask DCAA to do a defective pricing data review.

Another example might be found in a management reporting system that requires the contractor to furnish incurred cost data to the contracting agency. The obvious thing here would be costs, either generally or one category particularly, that seem to be running significantly less than projected. Your first step would be to analyze the data to localize, if possible, the areas of divergence. Then, if you cannot rationalize the differences, you might ask DCAA to take a look.

As for not believing the data were verified sufficiently at the time of negotiation, this might be the case when you could not give the ACO and the auditor the time they needed to make a complete review prior to contract award. It also might occur when there was a long interval between completion of field review and completion of negotiations.

When you receive an audit report setting forth possible defective data, you might weigh the evidence of the report against the PNM and the material in the files and then decide whether the defective data did in fact have a significant effect on price. The DCAA auditor may not have been aware of all the updating by the contractor during the course of the negotiations. Therefore, you may be able to fill in some of the blank spots with information about later purchase orders, more current labor and overhead rates, and proposed production techniques that the contractor submitted during negotiations. In addition, the defective data may not have had a significant effect on price if there is clear evidence that you had not relied on them. If the data you relied on were clearly defective, you must require a downward adjustment in price.

The contractor or the auditor may find that a defect is offset by an understated factual item. In such a case, the adjustment to the contract is the net effect of the offsetting defects, but downward only. If the errors show a net increase in the contract, you make no change. If you have $10 "down" and $5 "up," you adjust $5 down. The auditor may tell you only about decreases because he isn't looking for increases. The auditor who finds increases will tell you about them. In addition, you can expect the contractor to tell you about offsetting increases when you meet. You may want the auditor to verify the data on the "ups," if they are significant or not clearly applicable.

Unless the Government contract file shows otherwise, any adjustment for defective data should be the amount of the net defect plus related indirect expenses and profit. In determining the amount of a defect, use the cost value included in the negotiation objective, adjusted up or down to the value you ascribed to the element in the negotiated price.

You must take prompt action when you receive an audit report. After reviewing the facts and making your decision, prepare a memorandum setting forth your decision and the action taken or planned. You should specifically address each of the points in the audit report and indicate disposition. You will furnish a copy to the DCAA auditor who is charged with tracking the disposition of defective pricing cases.

If you suspect defective data in a contract subject to a later repricing action or a cost audit, you do not have to get a special audit. You should arrange for the auditor to include this feature in the regular audit process. This will reduce the work required and any necessary adjustment can be worked into the final negotiation.

You must approach defective pricing matters with the understanding that the contractor who gave you inaccurate, incomplete, or noncurrent data may have done so through carelessness or ignorance; it didn't have to be trying to deceive you. You may need to find out what caused the submission of defective data and get the contractor to correct the situation. This may require changes in estimating methods, improved internal communications, or more careful review by the contractor before signing the certification. Remember, it is important to recapture monies secured through defective pricing, but it is even more important that good pricing, using good cost or pricing data, be done in the first place.

10.3 Final Pricing

This section discusses contract close-out, final pricing of fixed-price arrangements, the handling of residual inventory and termination inventory, and the pricing of terminations.

The discussion covers the pricing aspects of a contract close-out, but it does not include the many administrative actions involved that have little to do with pricing. Information concerning these procedures is listed on DD Form 1597 "Contract Close-out Check-List." Pricing actions at contract close-out do not involve FFP contracts. Therefore, FFP contracts are excluded from this discussion.

When the contract is awarded, the Government wants the best product at the lowest cost in the best time. Now that the work is done and the Government has what it has contracted for, what are the problems?

One is that there probably are obligated monies still on the contract that may be used for something else when they have been deobligated. Another is that the final settlement of some contracts has to be negotiated by the parties, and negotiation issues tend to get blurred as time passes. People tend to forget the facts and the intentions and new people enter the picture who never can know all the facts. A third is that a completed but still open contract is bound to have loose ends. It is good administrative practice to clean these up as soon as feasible. We say "feasible" rather than "possible," because too fast a closing may mean you must accept inappropriate estimates or compromises.

Let's review the pricing tasks involved in close-out. For one, you may have DCAA Forms 1 ("Notice of Contract Costs Suspended and/or Disapproved") to settle on cost-type arrangements. These may have been set aside for many good reasons. Perhaps an Armed Services Board of Contract Appeals (ASBCA) case was pending that would have helped decide the issue. If so, find out where things stand and see what can be done to settle things now. Perhaps a principle is involved. If so, you have come to the day of reckoning; you may have to take a stand. Whatever the reason, set a schedule to clear all DCAA Forms 1.

Another task is to dispose of any outstanding unpriced actions like engineering changes, value engineering change proposals, and orders against basic ordering agreements. Again, set a schedule and get the job done, using pricing techniques appropriate to the situation. A third pricing task, negotiating final prices for incentive and redetermination contracts, will be discussed later in this chapter.

Your immediate task may be to get the contractor to submit a completion voucher and have it audited and cleared. We have said that you must clear the DCAA Forms 1. A review of the DD Form 1597 will reveal other clearances and reports that must be obtained, along with the closing statement, before that final voucher can be paid.

A physically completed contract can be closed ahead of overhead settlement when the unsettled indirect costs allocable to the contract are relatively insignificant and agreement can be reached on a reasonable estimate of allocable dollars. However, you must reach agreement without giving up your position on particular issues or setting a precedent. Further, the overhead settlement negotiated to expedite contract close-out will be considered final. No adjustment will be made against other Government contracts for any over or under recovery disclosed through the subsequent, regular final overhead rate negotiation or determination.

There may be occasions where performance under the contract is essentially complete and you will want to close the contract. If the estimated cost to complete is minimal, there is no reason why you should not go ahead and negotiate the final price.

The main thing to remember in negotiating contract close-outs is that you are dealing with facts,with things that have happened. The auditor plays a major role in telling you about these facts. However, your job is not just to adjudicate facts. You must look at the contract and all its changes. A contractor who spends money expects to recover it. The contractor usually will recover it unless the cost is clearly unreasonable, unallocable, or otherwise unallowable. It may be difficult to demonstrate the unreasonableness of a particular cost unless the contractor was told before it spent the money that it might be unreasonable.

Cost allocation is a difficult technical problem. The auditor is your best advisor with respect to indirect cost allocation. However, if there are issues involving direct cost allocation, an engineer may be helpful.

Final pricing of fixed-price arrangements

The ingredients of a fixed-price incentive with firm targets from the outset are target cost, target profit, target price, ceiling price, and share arrangement. A firm pricing arrangement is negotiated at the start of the contract to provide the basis for negotiating the final price. After negotiating the final cost figure, you apply the share formula to determine profit.

When the contract is complete, the contractor submits a statement of cost incurred. These costs are audited to determine allocability to the contract and to identify all costs that may not have been necessary to performance of the contract or are otherwise questionable. These data, the contractor's proposal and the auditor's advisory report, are the starting point in analysis leading to negotiation of the final settlement of the contract price.

The comparison of actual costs with those contemplated at the time the contract targets were negotiated is essential. You look at the original negotiation objective, together with subsequent changes, to identify and analyze the differences between expected and actual events. This will lead to an understanding of the problems the contractor had to solve and will help you decide the extent to which the actual cost of contract performance were reasonable and necessary. This analysis should cover engineering, production, and management control considerations. Your conclusions regarding reasonableness of and need for the incurred costs become part of your negotiation objective.

Remember that FPI arrangements are completion-type contracts. The contractor is required to deliver an end-item meeting minimum requirements within a specified ceiling price and by a specified date. While these requirements can be modified by the provisions of other contract clauses, failure to meet the original or any adjusted contract requirements constitutes a default of the contract. The contract may be terminated or, on the contracting officer's option the default may form the basis for an adjustment, with consideration, to the contract. In other words, failure to meet contract performance and delivery requirements can open the door for negotiation of an equitable adjustment in favor of the Government.

The other side of the coin is, of course, that the contractor may have performed at a level above target performance or delivered ahead of schedule in response to changed requirements. In such a case, there may be less reason to question the reasonableness of certain charges than otherwise. Under the rather rigid construction of the FPI, there is little room for compensating the contractor for outstanding performance in either product performance or delivery. However, with the combination FPI/award-fee pricing arrangement, both negative and reward situations can be accommodated.

Whenever schedule and performance incentives are added to an FPI arrangement, the final pricing problems increase. Determinations have to be made regarding success or failure in meeting the incentive goals. Also, the treatment of performance incentives earned or lost must be in accordance with the contract terms. Specifically, you must determine whether the contract provides that incentive payments are to be within or outside the ceiling price.

The fixed-price arrangement that provides for price redetermination after completion of the contract is similar to the FPI except that there is no share formula. You will negotiate a final equitable price based on actual costs in relation to the initial estimate and an evaluation of the contractor's actual performance. Use of this retroactively redetermined fixed-price arrangement is limited to the procurement of research and development where the dollar value is small and the period of performance is short. The price is redetermined on a completely retroactive basis. The redetermined price should be negotiated to give weight to the management effectiveness and ingenuity the contractor exhibited during performance. Although this is true of any final pricing action, added emphasis is warranted here.

Residual inventory

Residual materials in inventory must be given specific treatment in the final pricing of fixed-price redetermination and incentive arrangements and in the close-out of cost-reimbursement arrangements. Treatment varies with contract type.

Under cost-reimbursement arrangements, title to residual material is vested in the Government. In close-out, title does not revert to the contractor unless the parties agree to it specifically. If the contractor is to get title, consideration for the sale of residual material should be based on fair market value when computing the final costs of close-out. If the inventory is not sold to the contractor, the Government can take possession and direct the contractor to transfer it for use under another Government contract. The Government can also direct the contractor to sell the residual material and credit the Government with the proceeds.

Title to residual materials ultimately vests in the contractor under fixed-price arrangements, even under those that contain progress payment clauses. The contractor may transfer any unused material obtained under a completed incentive or redetermination contract to other active contracts or may dispose of it. For this reason, make sure that final costs, actual or estimated, have been reduced in an amount equal to the fair market value of the remaining inventory. When you price material transferred in this manner, make sure that the charge to the gaining contract is the same as the credit to the completed contract.

The following illustrate the concepts involved in pricing residual inventories in different circumstances:

a. Residual material is the result of an obvious overbuy. Quantities are greatly in excess of requirements and would not have been purchased if prudent practices had been followed. In this circumstance, you should negotiate elimination of the material costs generated by the excess buy. The cost is not contract-related because it should not have been incurred in the first place.

b. The residual inventory is normal and the contractor has followed prudent business practices. The residual could be transferred to a follow-on contract needing the material. The completed contract can be credited and the follow-on charged the same amount. A less favored treatment would be to include the material in the final cost of the completed contract and transfer the material to the new contract at no cost.

If there is no follow-on contract, you could negotiate a credit to the completed contract based on the fair market value of the residual inventory. The credit could range from scrap value to full actual cost, depending on your assessment of the utility of the materials.

c. The contractor proposes a credit to contract costs that you consider to be low for the material involved. If the contractor is slow to agree to a figure that represents fair market value, and if there is a possible future requirement, you might take title for the Government. Even the possibility that you would do this might lead the contractor to propose a more realistic credit.

Termination inventory

An inventory verification report by the plant clearance officer or technical inspector and a technical evaluation of the inventory are necessary parts of the termination settlement process. The verification report is used to (1) verify the existence of the inventory, (2) determine its allocability to the terminated portion of the contract, (3) make recommendations about its reasonableness in relation to contract production lead times, delivery schedules, and the availability of materials, and (4) ascertain whether any of the items can be used by the contractor without loss. The auditor needs a copy of the verification report to help establish the scope of review.

Quantities, quality, and applicability of inventory items need to be verified. Cost or pricing data must be analyzed to assure that prices are right. Inventory must be checked to see that common items have been excluded and materials that can be sent back to vendors have been. Audit and technical personnel cooperate in evaluating the termination inventory. The auditor tests physical counts and allocability to assist the technical review and also evaluates inventory pricing and contract costing. The auditor may make usage tests to determine whether material charged has been used in production.

The contractor is required to list, on separate inventory schedules, all Government-furnished property included in the termination inventory. The contractor may not withdraw Government-furnished property from the inventory for its own use without the contracting officer's approval. The property administrator examines Government-furnished property and reports to the contracting officer.

Material acquired before the date of the contract usually is not allocable to the terminated portion, on the premise that the material was not acquired for the contract. There are exceptions, however, such as when the material is acquired directly pursuant to the negotiation and in anticipation of the award of the contract to meet proposed delivery schedules.

Another exception would be when material is properly placed into production on the terminated contract and cut, shaped, built-in, or changed in such a manner that it cannot be returned to stock or used on other work of the contractor.

A third exception would be material acquired under a previously terminated contract and treated as a common item in the settlement of that contract for use on a contract now terminated.

In general, the quantities acceptable in termination inventories may include a net bill of materials for the terminated work plus a reasonable amount for scrap loss. Although otherwise acceptable, the quantities included in termination inventory schedules may be larger than should have existed at the date of termination. This condition may have been caused by the contractor's accelerated acquisition or production of items in unreasonable anticipation of delivery requirements. Excessive materials on hand as a result of this condition are not allocable to the termination claim.

Common Items

Except for property, delivery of which has been required by the Government, and except for Government-furnished property, the contractor's inventory schedules should not include any items reasonably usable, without loss to the contractor, on other work. Cost principles state that the cost of items reasonably usable on the contractor's other work shall not be allowable unless the contractor submits evidence that the items could not be retained without sustaining a loss.

Under certain circumstances, complex or specialized items may qualify as common items. For example, the compressor unit of a military jet engine might qualify as a common item if the contractor also uses the unit in the production of commercial jet engines. The memory unit of a computer might qualify if the unit also is used in a commercial computer. The test is whether the item can be diverted to other work of the contractor without loss.

Items do not need to be classified as common if the contractor can demonstrate that their elimination from the termination inventory would cause financial hardship. For example, when raw materials are common to the contractor's other work but the amount resulting from the termination would grossly exceed the contractor's usual inventory, the retention of the material might affect the contractor's cash or working capital position adversely and result in a financial hardship.

The retention of a large inventory by the contractor does not, in itself, warrant an excess inventory claim. When the inventory can be used within a reasonable period, regardless of size, the excess inventory claim would not be allowed. If, after submission of the termination settlement proposal, the contractor is awarded other contracts or receives commercial orders on which the items of the termination inventory can be used, the contractor should withdraw items to be used on the new work, except for Government property or other reserved items, adjust the claim, and notify the contracting officer.

Scrap

The cost of scrap such as trimmings, turnings, clippings, or unusable remnants generally is included in the cost of direct materials for parts, components, or end-items. Other production losses may occur due to testing, obsolescence, or physical loss of the components, subassemblies, or end-items. Depending on which stage in production the loss occurs, the cost involved may be only material or it may include material, labor, and applicable indirect costs.

Allocability of production losses is particularly important when the settlement proposal is submitted on the inventory basis; a portion of production losses is applicable to end-items completed and shipped. No costs allocable to units shipped should be included in the claim for units terminated. You should question unreasonable production losses, evidenced by a significant physical loss of components or subassemblies or by comparison with the rate of loss on similar products.

Completed end-items that do not meet contract specifications but that would have been reworked if termination had not occurred, are classified as reworkable rejects and listed on termination inventory schedules at the contract price less the estimated cost to rework. To avoid duplication of G&A expense and profit, reworkable rejects should not be claimed as work in process. If any of these, by reworking, can be diverted to other work of the contractor, it may be reasonable to allow the reworking costs in order to obtain credit for items reworked and diverted.

Generally, nonreworkable rejects are scrapped and are not included on inventory schedules. However, their costs are recoverable as part of the termination settlement to the extent that the costs are allocable to the terminated portion of the contract.

Returns

Contractors are encouraged to return contractor-acquired termination inventory to suppliers for full credit less the lower of either the supplier's normal restocking charge or the maximum authorized percentage therefor. The contractor may not include the cost of returned property in the settlement proposal but may include the transportation, handling, and restocking charges incident to the returned property. Except for diversion to other work of the contractor or retention by the Government, this method is preferred for disposing of termination inventory.

Obsolescence

When design or specifications of end-products terminated under a contract have been changed and the proposed settlement is on an inventory basis, you should determine whether the inventory includes items made obsolete by the contract change. Obsolete materials and tooling costs should not be part of the termination inventory if the contractor has received consideration for costs attributable to obsolescence by an equitable adjustment in the contract price of items delivered. If the contractor has waived adjustment of the contract price because there was sufficient consideration in the original price to cover the cost of the obsolete material and the contract is terminated later, the contractor may not then include obsolete materials in the termination claim.

Special Tooling

Items claimed as special tooling must meet the FAR definition of special tooling. When tooling can be used on other work, it does not qualify as special tooling and the costs are not allocable to the terminated portion of the contract. In many cases, it may be desirable to get a technical determination whether claimed special tooling meets the FAR definition.

The contractual intent regarding reimbursement of special tooling costs affects the allowability of these costs. Before accepting the costs, you should determine that the special tooling was not acquired before the date of the contract or to replace items so acquired, and that the special tooling claimed is not consumable small tools or items that could be classified as capital equipment.

Termination pricing

A contract may end because someone decides that it should be terminated, either partially or in total. If totally terminated, the action may be due to the Government's desire to discontinue the contract (a convenience termination) or due to the contractor's inability to perform adequately (a default termination). Partial terminations usually are convenience terminations: The Government wants only a part of what it ordered originally.

A termination contracting officer (TCO) is appointed to close out the terminated contract or portion. The individual appointed may be a PCO or ACO, or a person who specializes in terminations; in any event, the appointee is a warranted contracting officer. Termination pricing is similar to any other final pricing job with a few added wrinkles. As you might expect, the auditor is a principal advisor to the TCO just as in a contract close-out. Other specialists may be called on to help with parts of the termination claim and technical personnel usually advise on inventory, start-up costs, terminated and continuing portions, and other matters.

This discussion concentrates on convenience terminations. Default terminations are rare and usually require only (1) a determination that the contractor does or does not owe the Government anything because of default and (2) a determination of the cost of any inventory the Government wants to acquire.

The contractor must stop work on the terminated portion immediately. This includes seeing to it that subcontractors also stop work. Obviously, *immediately* is a relative term that depends on the specific instructions in the termination notice, when the contractor actually received the notice of termination, how quickly it can identify the processes and actions that must be stopped, and pass this on to workers and subcontractors.

If the contractor does not take prompt and effective action to stop work, you might not consider or reimburse the excess cost. But be sure you are reasonable. An assembly line might be stopped instantly, but subcontracted parts in transit might have to continue to destination, which means a receiving crew will continue working. A heating process might have to be cooled slowly to prevent damage to equipment. Security areas might have to be guarded for some length of time. Personnel at dispersed locations must be moved home. These actions take time.

When a termination for convenience occurs, you can assume that the Government owns all materials, purchased parts, and work-in-process that were purchased and received for the contract before termination. While unprocessed inventory may be relatively simple to identify and cost, work-in-process is not always so easy. Work-in-process includes labor and indirect costs in addition to material and parts. It may be necessary to estimate the portion of labor and indirect costs that applies to the finished products and the portion that applies to work-in-process.

This is particularly important in fixed-price arrangements because completed items will be priced separately from incomplete terminated items. The TCO, working with pricing and audit advisors, must reach agreement with the contractor on how this will be done. Someone will verify the quantity, quality, and physical allocability of items to the terminated portion of the contract. The things to watch for are material acquired prior to the contract, possible unreasonable quantities procured ahead of need, common items, and items that can be returned to vendors for credit.

It may be necessary to negotiate with the contractor to keep items for possible future use. These may include items regularly used in commercial products, items that could be used in commercial products, items that possibly could be used in the future, or items that could be converted to other uses. The contractor may face excessive inventory quantity, excessive inventory value, or unreasonable risk of loss, and might not want to assume the items at full purchase cost. In some cases you might negotiate a price the contractor will pay to keep the items. Obviously, this would be more than scrap value, after considering handling costs, and would be done after some assurances that other Government elements have no need for the items at the price.

Settlement Costs

Negotiation may require a series of agreements to minimize settlement cost. Settlement costs are one of the peculiarities of termination and can be thought of as the cost of cleaning up after the termination has been ordered. Do not confuse this with *cancellation charges* contained in some arrangements. *Cancellation charges* may include settlement type efforts, but generally they refer to cost occasioned by changing production schedules and the cost of long-leadtime production articles.

Because the cleanup effort starts almost from the second the termination occurs, early agreement on material disposition can eliminate costs incurred to safeguard, pack, prepare for shipment, and account for inventory items. Similarly, expeditious settlement of subcontract claims and presentation of the claim to the Government will reduce the size of the settlement claim.

Many cleanup activities will be performed by personnel who normally are classified as indirect or by direct personnel doing other than typical direct work. Much of this time will be handled as a direct charge to the terminated portion of the contract. Some overhead will be permitted, but it is limited to fringe payroll costs, occupancy costs, and direct supervision. If the contractor has continuing production or work, such as another contract or the continuing portion of the same contract, the usual treatment is to credit the regular overhead accounts for the applicable share of these limited costs charged to the settlement expenses. This is one time that such an "abatement" of overhead appears warranted.

If a large contract is terminated, the contractor may not be able to absorb the personnel employed on the terminated contract. This means that some sort of severance pay is involved. Because most contractors have a normal layoff cycle to match the ebb and flow of production, the contractor probably has a procedure for handling such cutbacks. One might be a definite period of pay after layoff. To the extent that the termination caused the layoffs and the payments are reasonable, they probably are good costs in the termination.

Massive terminations need closer scrutiny because there are many ramifications. Sometimes reserves have been set up to hedge against mass termination layoffs. These must be considered. In addition, mass layoffs in a seasonal industry might not have the same effect as a mass layoff at a single plant in a small community. No matter what the circumstances, mass severance cost will have to be judged case-by-case and should have early agreement on exactly what criteria will be followed. If there is one, you can expect to get help on the proper course of action from economists, lawyers, and higher headquarters, in addition to your normal advisors.

Loss Situation

Fixed-price arrangements present special problems. If it is shown that a contractor would have lost money on the fixed-price arrangement if it were completed, you must be sure the contractor absorbs an appropriate share of that loss on the termination. The termination is not intended to *bail* *out* a contract that would have shown a loss. The loss you compute is applicable to the fully completed and partially completed portion of the contract, not the settlement expenses.

The problem may be complicated if the contractor is not required to estimate costs to completion as it would be under contractor cost data reporting. You must ask for such an estimate. Whether the contractor makes an estimate or not, you make one based on the learning experience in the completed portion. If little work has been performed, it may be very difficult to show evidence of a projected loss. However, even a small amount of solid production following the prototypes should be strong evidence of what eventual cost would have been. It is not a question of whether you should make a loss factor adjustment; you make the adjustment if it is apparent that there would have been a loss.

Completely terminated cost-reimbursement arrangements are slightly different. Although the contractor may continue to submit vouchers up to six months after termination, it must at some point in time submit a termination claim which will be negotiated.

Basis of Claim

Claims on a fixed-price arrangement may be made on an inventory basis or on a total cost basis. While the inventory basis, which is applicable to the terminated portion only, is preferred, the TCO may permit claims on a total cost basis. The total cost basis may be used if production has not yet started, if the contractor's accounting system will not develop unit costs for work-in-process inventory and finished goods, if the contract does not specify unit prices, or if there is a complete termination of a letter contract. SF 1435, Settlement Proposal (Inventory Basis), or SF 1436, Settlement Proposal (Total Cost Basis), are used for fixed-price arrangements. SF 1437, Settlement Proposal for Cost-Reimbursement Type Contracts, is used for cost-type arrangements.

Profit or Fee

Profit must be adjusted in termination settlements of fixed-price arrangements. Settlement expenses and settlements with subcontractors will not be the basis for profit, but the contractor's efforts and the complexity of the actions on the terminated portion will be considered in arriving at the profit. FAR lists nine factors to be considered:

a. Extent and difficulty of the work done, in relation to the total work required.

b. Engineering work and other necessary services.

c. Efficiency of the contractor.

d. Amount and source of capital employed and extent of risk assumed.

e. Inventive and developmental contributions.

f. Character of business.

g. Rate of profit that would have been earned.

h. Rate of profit contemplated at the outset.

i. Character and difficulty of subcontracting.

The amount of fee to be paid, if any, is prescribed in cost-reimbursement arrangements. The fee paid in termination generally is based on a percentage of completion of the contract or of the terminated portion of the contract. The extent and difficulty of the work performed is a key consideration. No fee is to be included for subcontract effort.

Reviews

Formal reviews and boards are set up to approve termination negotiation agreements. Documentation will be important. Termination agreements must be thought of as an equitable adjustment for a contractor with little good accruing to the Government beyond the avoidance of further expenditures. When you buy something that is useful, the price may be too high or too low but it results in payment for something of value. Terminations seldom result in anything of value for the Government; however, a contractor who intended to meet the Government's need is entitled to fair compensation for its efforts.

10.4 Miscellaneous

This section discusses three widely different topics, cost accounting standards, indirect cost monitoring, and cost estimating support.

Cost accounting standards

Certain national defense contractors and subcontractors are required to comply with cost accounting standards, to disclose their cost accounting practices and procedures in writing, and to follow those disclosed practices and procedures consistently. The contracting officer decides when a proposed contract may require CAS coverage and includes a notice to that effect in the solicitation. Usually, the contracting officer will not award a CAS-covered contract until the ACO has determined that the disclosure is adequate.

The contract auditor reviews the disclosure statement (CASB-DS-1) to see if it describes the offeror's cost accounting practices and the ACO makes a determination based on the auditor's findings and recommendations. The auditor, after notification of adequacy, makes a detailed review to determine whether disclosed practices comply with FAR Part 31 and the cost accounting standards.

In subsequent reviews, the auditor may find the contractor to be in noncompliance for any of a number of reasons. Failure to follow disclosed practices, failure to comply with applicable standards, and conflict with FAR Part 31 are three reasons. When the ACO is advised by the auditor that there is noncompliance, the ACO will ask the price analyst for a comprehensive report on the recommended finding of noncompliance.

Assuming agreement that the contractor is not complying, the ACO will require the contractor to correct the condition. The ACO also will require the contractor to submit a proposal describing the impact of noncompliance on the cost of all covered contracts. This proposal must substantiate any increased costs attributable to noncompliance, decreased costs, or the contention that there was no impact on cost or price. The price analyst will get audit input and report findings and conclusions to the ACO, who will recover any increased cost or price attributable to noncompliance.

Notwithstanding the assigned responsibility of the ACO and auditor, all members of the field pricing team should identify and report actual and suspected noncompliance to the ACO. Normal pricing reviews may lead to detection of noncompliance.

Equitable Adjustments

The cost accounting standards clause provides that the contractor shall agree to an equitable price adjustment if the cost of covered contracts is affected by a change to an established practice which is brought about by the promulgation of a new cost accounting standard. A price adjustment resulting from promulgation of a new standard may be either an increase or a decrease, and it is prescribed whether or not the contractor has been required to file a disclosure statement. (No standards have been promulgated since 1980.)

This clause also provides that the contractor will agree to negotiate the terms and conditions under which voluntary changes to disclosed practices may be made. In the case of voluntary changes, an upward adjustment can be made in a contract only if, and to the extent that, the increase is fully offset by decreases in other covered contracts.

In pricing the equitable adjustment, the ACO will obtain the contractor's price adjustment proposal and usually will ask the price analyst to get the audit report and any needed input from other team members. Certified cost or pricing data may be required.

The ACO negotiates the equitable adjustment (up or down) that can occur when a new standard is promulgated or when a voluntary change in accounting practices is requested (at no increase in cost to the Government, considering all covered contracts). The ACO negotiates the adjustments for all covered Government contracts and subcontracts for civil agencies as well as DoD. The ACO writes a negotiation memorandum and executes changes to DoD contracts and advises each of the civil agencies and other ACOs whose prime contracts are affected of their shares of the equitable adjustment by sending copies of the negotiation memorandum and requesting appropriate action.

New Standards

Should a new standard be promulgated, the rule is that the contractor must comply on contracts entered into on a prospective basis. When a new standard becomes effective on entering into a new contract, it also becomes effective on all existing covered contracts of the contractor. The contractor submits a "claim" for the equitable adjustment that shows the impact of the new standard on *all* existing covered contracts and covered subcontracts. The effective date of a new standard will depend upon the circumstances. The date specified could be:

a. Date of award of a new contract or subcontract.

b. Date of final agreement on price.

c. A date such as the beginning of the contractor's next fiscal year.

The real effect of an accounting change is the increased or decreased cost the Government will pay or take credit for on covered contracts. The change in cost is due to a technical adjustment and not to a change in the work or effort required. This fact should be considered in negotiating the amounts of any equitable adjustments. As with any other contract change, the specific facts should determine the equity in each case.

Voluntary Changes

In the case of voluntary changes, the contractor will propose a change and it will be reviewed for compliance with CASB standards and FAR Part 31. If it is found acceptable, the contractor will submit a cost impact proposal. After the impact proposal is audited and analyzed, the ACO will negotiate the terms and conditions of the change, including the effective date. If the cost or price impact would result in an overall increase to covered contracts, the contractor is permitted to make the change only if willing to absorb the net increased costs. The examples, shown in Table 10-5, illustrate the point that the Government cannot accept ups in excess of downs.

Table 10-5

	CONTRACT TYPE	AGREED-TO IMPACT	NET EFFECT
Example 1	FFP CPFF	$15,000 (increase) 10,000 (decrease)	$5,000 (increase)
Example 2	FFP CPFF	10,000 (decrease) 15,000 (increase)	5,000 (increase)
Example 3	FFP CPFF	10,000 (decrease) 10,000 (increase)	-0-

In Example 1, the FFP contract could be increased by only $10,000, preventing the contractor from receiving the net increased cost of $5,000. The CPFF contract automatically will have fewer costs allocated to it (anticipated allocation). The adjustment here would be to the estimated cost, and perhaps to the fixed fee.

In Example 2, the FFP contract would be adjusted downward by $10,000. Because the CPFF contract will automatically have $15,000 additional costs allocated to it, some specific action must be taken so that the contractor will receive no more than the amount of the decrease ($10,000) on the FFP contract. This could best be accomplished by agreeing to a disallowance of $5,000 on those costs vouchered by the contractor for reimbursement on the CPFF contract. It would be inappropriate to adjust the FFP contract downward by $15,000 because the estimated cost/price impact was only $10,000.

In Example 3, although the net effect is zero, due to offset, some specific action must be taken to prevent a windfall to the contractor. The appropriate action here would be to reduce the FFP contract by $10,000. It would be much less desirable to specifically disallow $10,000 on the CPFF contract since this manner of adjustment does not reflect the actual impact on the contracts in question.

Once offsets have been applied, the following factors should be examined to determine the allocation of net decreased costs to the affected covered contracts:

a. Ratio of original cost/price impact to dollar value of contract.

b. Percent of contract completed.

c. Face value of the contract.

Noncompliance

Everyone hopes that a contractor will neither intentionally nor accidentally fail to comply with the law, the standards, or its disclosed practices. But, as it is with defective pricing, you can expect it to happen. When it does, you must take steps to recover any increased cost to the Government that resulted from noncompliance, plus interest on the amount paid. (Interest rates are determined periodically by the Secretary of the Treasury.)

In the case of cost-reimbursement and FPI arrangements, increased cost to the Government is measured at the level of costs that were paid due to the noncompliance. In the case of an FFP arrangement, however, increased cost to the Government cannot be measured by a higher level of costs paid; the amount negotiated normally will be the amount paid. Increased cost under an FFP arrangement is the difference between the cost estimates used in negotiations and the cost estimates that would have been used had the contractor proposed on the basis of the proper practices.

No offsets are permitted in cases of noncompliance; the total of increases will be recovered and decreases will be ignored.

Monitoring indirect costs

Control of indirect cost is the common responsibility of the contractor and Government personnel. Obviously, the primary responsibility rests with the company. Control by the contractor implies cost management. The Government's function is to review the contractor's proposed indirect cost expenditures and the supporting company analyses. Control exercised by the Government is a monitoring function. The terms *management* and *monitoring* denote the difference between making a cost decision and influencing that decision.

Indirect costs may and should be monitored by overhead teams at large defense contractor plants. One person, usually the ACO, reviews the contractor's initial budget, negotiates advance agreements on specific elements of cost, negotiates forward pricing rate agreements, reviews performance reports (variance analyses), reviews changes to budgeted costs, and provides comments on indirect rates used on all proposals. The auditor determines the final indirect cost rates. The indirect cost monitoring team at the profit center (division or plant) where the costs are incurred includes an auditor, a price analyst, an overhead specialist, an industrial engineer, and others as required.

The Government's monitoring task is to assure that the contractor's indirect cost decisions are reasonable at three stages of the budgeting and cost incurrence process: when the budget is approved, during cost incurrence, and at final settlement.

During the budget cycle, the Government monitor must insure that the company has reviewed all indirect functions for necessity. In addition, the monitor makes certain that the contractor is not foregoing the performance of indirect functions that would reduce total costs because of any reluctance to increase indirect costs.

During the cost incurrence period, there may be adjustments to the budgeted cost as a result of changes in basic assumptions such as predicted volume or new requirements. These changes must be evaluated by the monitor. The monitor also must compare actual cost with the budget and assure that significant variations are reported to contractor personnel responsible for controlling costs.

If it appears that the contractor is not controlling costs adequately, the Government monitor must persuade the company to do so. The Government's position must be stated in terms of its unwillingness to reimburse or otherwise recognize a cost if the company is not able to hold that cost to a reasonable level. The active support of a major program office may help.

At the end of the contractor's accounting period, the contractor's actual costs will be audited and the costs must meet the FAR tests of allowability. The determination of allowable costs will be influenced by the advice that the monitor gave the company during the year as the costs were being incurred.

Support to cost estimating

As a discipline, the Government generally uses cost estimators to develop budget or program decision estimates. Contract pricing personnel and auditors may feel that they are not part of the process. This is not how it should be. Contracting personnel should contribute to and draw from the cost estimating process. You need to understand the process if you are to make maximum use of its output and if you use the output, you must contribute to the input.

Normally, a weapon program is born out of a perceived threat by a potential enemy and the collected intelligence about our ability to counter that potential threat. The weapon usually challenges our technology, and technical and cost uncertainties abound. When the weapon has reached the stage of technical feasibility, it is necessary to measure its eventual cost. Often the weapon is years away from production, years away from contractor selection, and its specific configuration still is uncertain. At this stage the best way to get a handle on eventual cost is to use parametric cost estimating. This technique needs data and the assurance that input data are valid. Contractors can help in this phase.

The parametric technique is very similar to the cost estimating relationships (CERs) described earlier. The method is the same, but the data base and scope of the model are likely to be much broader. Instead of worrying about the cost of an airframe, an engine, or a guidance system, the parametric model for a weapon cost estimate encompasses the total system -- everything the weapon must include. A constant dollar base year generally is used to eliminate the effect of prior level changes on the data. Past and current contracts are the sources of the data. However, people tend to be rather cavalier about requiring good data if they do not believe it will help them manage their programs. As a consequence, they deny themselves useful data and cost estimates for future programs suffer.

As programs mature, cost estimates often become mixtures of incurred costs and parametric and engineered estimates. You might participate in an exercise to estimate the total cost of a program and then have to analyze a contractor's proposal covering a part of that total program. If this happens, don't forget what you know about how that part fits into the total and don't ignore the assumptions made in estimating the total cost. Remember that the cost of all pieces of a program has been estimated before, in other times and for other purposes. Tie this knowledge into your current analysis.

For example, if all program estimates of production costs have used an 83 percent learning curve, but the contract estimate shows a 78 percent curve, you must find out why. There might be a good reason that relates to the data base, the unique experience of the particular company, or changes in configuration and changes in production methods. Satisfy yourself that the reason is valid and feed the information back into the system so that succeeding program estimates can benefit.

The contractor cost data reporting system (CCDR) is the basic instrument supplying data for program cost estimating. It also supplies data useful in contracting. The reporting is built on the program's specific work breakdown structure. This is usually at Level 3, as set forth in MIL-STD-881. Much of the program's Level 3 hardware is subcontracted or furnished by the Government. As a result, the reporting touches a greater number of companies than just the system contractor.

Two forms in the CCDR system are of primary importance to contracting personnel. One is the DD Form 1921-1, "Functional Cost-Hour Report" and the other is the DD Form 1921-3, "Plant-Wide Data Report." The 1921-1 displays costs by functional categories in a presentation not unlike that of a contract pricing proposal. The 1921-3 report provides a budgetary view of the contractor's total business base, indirect costs, and direct labor rates. When the contract requires reporting, CCDR forms are to be submitted at least annually. Data from these reports can form a useful data bank.

The system program office, the comptroller, or a system analysis office may, from time to time, require a special program cost estimating exercise. You may be drafted for such a job and find yourself wondering why. After all, you price contracts and not total programs. The answer may be obvious. If the decisions are to be right, the decisionmakers need good data. You can't be sure that the decisions will be right, but you can be sure that the data reflect the best possible cost estimates and highlight whatever procurement problems may be involved. Unless the decisions are sound, you may find yourself with $100 in your pocket trying to buy $1,000 worth of product.

Suggested Readings

Interim Pricing

FAR	15.809	Forward pricing rate agreements
DFARS	15.809	Forward Pricing Rate Agreements
FAR	15.804-4	Certificate or Current Cost or Pricing Data
DFARS	15.804-4	Certificate or Current Cost or Pricing Data
FAR	15.804-7	Defective cost or pricing data
DFARS	15.804-7	Defective Cost or Pricing Data

Miscellaneous

DFARS	42.70	Monitoring Contractors' Costs

APPENDICES
Acronyms/Glossary

APPENDIX A

LIST OF ACRONYMS

Terms, titles, and phrases that are shortened to acronyms are spelled in full the first time they appear and are accompanied by their acronyms in parentheses. The following is an alphabetical list of all ASPM acronyms and their meanings.

ACO	Administrative contracting officer
A-E	Architect-Engineer
ASBCA	Armed Services Board of Contract Appeals
B&P	Bid and proposal
BLS	Bureau of Labor Statistics, U.S. Department of Labor
CASB	Cost Accounting Standards Board
CCDR	Contractor cost data reporting system
CDRL	Contract data requirements list
CERs	Cost estimating relationships
CPAF	Cost-plus-award-fee
CPFF	Cost-plus-fixed-fee
CPIF	Cost-plus-incentive-fee
CPPC	Cost-plus-percentage-of-cost
CR	Cost contract
CS	Cost-sharing
CURFI	Computerized least squares curve fit
DCAA	Defense Contract Audit Agency
DCAAM	Defense Contract Audit Agency Manual
DCAS	Defense Contract Administration Services, Defense Logistics Agency
DFARS	DoD FAR Supplement
DoD	Department of Defense
FAR	Federal Acquisition Regulation
FFP	Firm-fixed-price
FIFO	First-in, first-out
FMS	Foreign military sales
FOB	Free on board
FPI	Fixed-price incentive
FPIF	Fixed-price incentive, firm target
FPIS	Fixed-price incentive (successive targets)
FPR	Fixed-price with redetermination
G&A	General and administrative
GAO	General Accounting Office
GNP	Gross national product
IFB	Invitation for bids
IR&D	Independent research and development

L-H	Labor-hour
LIFO	Last-in, first-out
MTBF	Mean time between failures
MTM	Methods time measurement
MTTR	Mean time to repair
N/C	No charge
OSD	Office of the Secretary of Defense
PCO	Procuring (or procurement) contracting officer
PF&D	Personal, fatigue, and delay
P.L.	Public law
PNM	Price negotiation memorandum
PR	Purchase (or procurement) request
R&D	Research and development
RFP	Request for proposals
RFQ	Request for quotations
RTP	Request for technical proposals
TCO	Termination contracting officer
T-M	Time and materials
TMU	Time measurement unit

APPENDIX B

GLOSSARY

A glossary does not define its terms, but rather explains or characterizes them within the general context of their use. This glossary is a collection of some of the terms used throughout the manual, as well as others commonly associated with contract pricing. While it is always instructive (and sometimes necessary) to search the law or regulatory base for the specific meaning and application of terms, there are times when it is helpful to understand their fundamental sense and everyday usage. This is the objective here.

There are dozens of terms that reflect the contract pricing environment, but few of them are subject to precise, unerring definition. Many are terms of art, colored by circumstance and application in different situations. So, while the following explanations and characterizations are sound, the reader is cautioned to remember that this is a glossary, not a dictionary.

Many of the terms related to contract pricing are composite or compound terms. In this glossary, the listing is purely alphabetical; the key word is the first word, whether it be a noun or a modifying word or phrase.

Actual cost: A cost sustained in fact, on the basis of costs incurred, as distinguished from projected or estimated costs.

Advance payment: An advance of money made by the Government to a contractor prior to, in anticipation of, and for the purpose of performance under a contract or contracts.

Allocable cost: A cost is allocable if it is assignable or chargeable to one or more cost objectives in accordance with the relative benefits received or other equitable relationships defined or agreed to between contractual parties.

Allowable cost: A cost is allowable if it meets the tests of reasonableness and allocability, is in consonance with standards promulgated by the Cost Accounting Standards Board (if applicable), or otherwise conforms to generally accepted accounting principles, specific limitations or exclusions set forth in FAR Part 31, or agreed-to terms between contractual parties.

Assist audit: An audit performed by one audit office at the request of another audit office. The assist audit is usually an adjunct to or an integral part of an audit being performed by the requesting office.

Audit: The systematic examination of records and documents and the securing of other evidence by confirmation, physical inspection, or otherwise, for one or more of the following purposes: determining the propriety or legality of proposed or consummated transactions; ascertaining whether all transactions have been recorded and are reflected accurately in accounts; determining the existence of recorded assets and inclusiveness of recorded liabilities; determining the accuracy of financial or statistical statements or reports and the fairness of the facts they present; determining the degree of compliance with established policies and procedures relative to financial transactions and business management; and appraising an accounting system and making recommendations concerning it.

Auditor: A professional accountant acting as a principal advisor to contracting officers on contractor accounting and contract audit matters.

"Based on" price: A price may be considered to be *based on* established catalog or market prices of commercial items sold in substantial quantities to the general public if the item being purchased is sufficiently similar to the commercial item to permit the difference between the prices of the items to be identified and justified without resort to cost analysis.

Bid and proposal costs: Costs incurred in preparing, submitting, and supporting bids and proposals (whether or not solicited) on potential Government or non-Government contracts.

Bill of materials: A descriptive and quantitative listing of materials, supplies, parts, and components required to produce a designated complete end-item of material or assembly or subassembly. May also show estimated costs or fixed prices.

Burden: (See indirect cost.)

Change order: A written order signed by the contracting officer, directing the contractor to make changes that the Changes clause of the contract authorizes the contracting officer to direct without the consent of the contractor.

Commerciality: One of two conditions that must be met if an item is to qualify for the established catalog or market price exemption from the requirement for submission of cost or pricing data. A commercial item (which may be either supplies or services) is of a class or kind that is (1) regularly used for other than Government purposes, and (2) sold or traded in the course of conducting normal business operations. (The other condition – that the item be *sold in substantial quantities to the general public* – is met when the facts support a reasonable conclusion that the quantities regularly sold to other than affiliates of the seller for end use by other than the Government agencies are sufficient to constitute a real commercial market.)

Comparability: A condition that exists between an offered price and some other price against which it is compared. This condition is necessary for effective price comparison and exists when all price-related differences have been identified and accounted for so that the prices being compared are based on relatively equal assumptions.

Competition: An environment of varying dimensions relating to buy-sell relationships in which the buyer induces, stimulates, or relies on conditions in the marketplace that cause independent sellers to contend confidently for the award of a contract.

Competitive proposals: A competitive procurement that (1) is initiated by a request for proposals, which sets out the Government's requirements and the criteria for evaluation of offers, (2) contemplates the submission of timely proposals by the maximum number of possible offerors, (3) usually provides discussion with those offerors found to be within the competitive range, and (4) concludes with the award of a contract to the one offeror whose offer is most advantageous to the Government, considering only price and the other factors included in the solicitation.

Competitive range: A range appropriate to the postevaluation, preaward phase of competitive procurements. Determined by the contracting officer on the basis of price, cost, or technical and other salient factors. Unless excepted by circumstances prescribed by regulations, the contracting officer must conduct written or oral discussions with all responsible offerors who submit proposals within the competitive range.

Constructive change: During contract performance, an oral or written act or omission by the contracting officer or other authorized Government official, which is of such a nature that it is construed to have the same effect as a written change order.

Contingency: A possible future event or condition arising from presently known or unknown causes, the cost outcome of which is indeterminable at a present time.

Contract: A term used to describe a variety of agreements or orders for the procurement of supplies or services. An agreement, enforceable by law, between two or more competent parties, to do or not do something not prohibited by law, for a legal consideration.

Contract modification: Any unilateral or bilateral written alteration in the specification, delivery point, rate of delivery, contract period, price, quantity, or other provision of an existing contract, accomplished in accordance with a contract clause (e.g., change order, notice of termination, supplemental agreement, exercise of a contract option, and so forth).

Contract pricing: A series of actions used to obtain, evaluate, assess, verify, and adjudge cost or pricing information, and to record the steps taken to ascertain that prices agreed to have been found to be fair and reasonable.

Contract pricing proposal cover sheet: The vehicle for submitting to the Government a pricing proposal supported by estimated and incurred costs by contract line item. The Standard Form 1411 (SF 1411) is the cover sheet for the required submission which shall be prepared to satisfy the instructions and formats of FAR Table 15-2.

Contract type: Refers to specific pricing arrangements employed for the performance of work under contract. Specific pricing (or compensation) arrangements, expressed as contract types, include firm-fixed-price, fixed-price incentive, cost-plus-fixed-fee, cost-plus-incentive-fee, and several others. Among special arrangements that use fixed-price or cost-reimbursement pricing provisions are instruments called indefinite delivery contracts, basic ordering agreements, letter contracts, and others.

Contracting officer: Any person who, either by virtue of position or by appointment in accordance with prescribed regulations, is vested with the authority to enter into and administer contracts and make determinations and findings with respect thereto, or with any part of such authority. [In this manual, three kinds of contracting officers are identified: procuring (or procurement) contracting officer (PCO), administrative contracting officer (ACO), and termination contracting officer (TCO).]

Contractor financing (order of preference): While exceptions may arise in specific cases, the following order of preference generally should be observed: (1) equity capital, (2) private financing on reasonable terms, (3) customary progress payments, (4) guaranteed loans, (5) unusual progress payments, and (6) advance payments.

Cost accounting: A system of accounting analysis and reporting on costs of producing goods or services, or of operating programs, activities, functions, or organizational units. The system also may embrace memorandum records, cost estimating, determination of cost standards based on engineering data, and comparison of actual and standard costs for the purpose of aiding cost control.

Cost analysis: The review and evaluation of a contractor's cost or pricing data and of the judgmental factors applied in projecting from the data to the estimated costs. The purpose is to form an opinion leading to a position on the degree to which the contractor's proposed costs represent what contract performance should cost, assuming reasonable economy and efficiency. It includes appropriate verification of cost data, evaluation of specific elements of costs, and projection of these data to determine the effect on price factors like cost necessity, allowances for contingencies, and the basis used for allocation of overhead costs.

Cost estimating: The process of forecasting a future result in terms of cost, based upon information available at the time.

Cost incurred: A cost identified through the use of the accrued method of accounting and reporting, or otherwise actually paid. Cost of direct labor, direct materials, and direct services identified with and necessary for the performance of a contract, and all properly allocated and allowable indirect costs as shown by the books of the contractor.

Cost objective: A function, organizational subdivision, contract, or other work unit for which cost data are desired and for which provision is made to accumulate and measure the cost of processes, products, jobs, capitalized projects, and so forth.

Cost or pricing data: Data consisting of all facts existing up to the time of agreement on price, which prudent buyers and sellers would reasonably expect to have a significant effect on price negotiations. Being factual, these data are types of information that can be verified. They do not reflect on the accuracy of the contractor's judgment about estimated future costs or projections; they do, however, reflect on the data upon which the contractor based its judgment.

Cost overrun (or underrun): A net change in contractual amount over (under) that contemplated by a contract target price (FPI contract), estimated cost (any cost-reimbursement type contract), or redeterminable price (FPR contract), due to the contractor's actual costs being over (under) target or anticipated contract costs, but not attributable to any other cause of cost growth (e.g., quantity changes, engineering changes, economic changes, or changes in estimates of program project costs).

Cost reimbursement: Refers to a family of pricing arrangements that provide for payment of allowable, allocable, and reasonable costs incurred in the performance of a contract, to the extent that such costs are prescribed or permitted by the contract. In the case of a CPFF arrangement, costs may vary under or over the initially agreed-to estimate, but the fee remains fixed as an expressed dollar amount and is not subject to adjustment by reason of the contractor's cost experience during the life of the contract.

Cost risk: An assumption of possible monetary loss or gain in light of the job or work to be done. One of the elements to be considered in the negotiation of a fair and reasonable price, as well as in determining the type of contract under which performance will occur.

Defective cost or pricing data: Certified cost or pricing data subsequently found to have been inaccurate, incomplete, or noncurrent as of the effective data of the certificate. In this case, the Government is entitled to an adjustment of the negotiated price, including profit or fee, to exclude any significant sum by which price was increased because of the defective data, provided the data were relied upon by the Government.

Direct cost: Any cost that is specifically identified with a particular final cost objective, but not necessarily limited to items that are incorporated in the end product as material or labor.

Disclosure statement (cost accounting standards): Persons or firms required to complete and submit a disclosure statement (Form CASB-DS-1) describe their contract cost accounting practices by providing data that are responsive to the form's requirements. Applies to all defense contractors who enter into negotiated national defense contracts in excess of $100,000, with certain exceptions applying to contracts where the price negotiated reflects or is based on (1) established catalog or market prices of commercial items sold in substantial quantities to the general public, or (2) prices set by law or regulation. The presumed or anticipated presence of a competitive environment does not constitute an exception or exemption for the submission of a disclosure statement.

Economic price adjustment: An alteration permitted and specified by contract provisions for the upward or downward revision of a stated contract price upon the occurrence of certain contingencies that are defined in the contract.

Escalation: A term traditionally used to indicate an upward or downward movement of price. *Economic price adjustment* is the contemporary term used to express the sense of *escalation*.

Established catalog price: A price included in a catalog, price list, schedule, or other form that (1) is regularly maintained by a manufacturer or vendor, (2) is published or made available for inspection by customers, and (3) states prices at which sales are currently or were last made to a significant number of buyers constituting the general public.

Established market price: A current price, established in the usual and ordinary course of trade between buyers and sellers free to bargain, which can be substantiated from sources independent of the manufacturer or vendor, although such pricing data may have to come from the seller.

Fair and reasonable price: A price that is fair to both parties, considering the agreed-upon conditions, promised quality, and timeliness of contract performance. Although generally a fair and reasonable price is a function of the law of supply and demand, there are statutory, regulatory, and judgmental limits on the concept.

Fee: In specified cost-reimbursement pricing arrangements, fee represents an agreed-to amount beyond the initial estimate of costs. In most instances, fee reflects a variety of factors, including risk, and is subject to statutory limitations. Fee may be fixed at the outset of performance, as in a cost-plus-fixed-fee arrangement, or may vary (within a contractually specified minimum-maximum range), as in a cost-plus-incentive-fee arrangement.

Field pricing support: Involves the analysis of contractor pricing proposals by any or all field technical and other specialists, including plant representatives, administrative contracting officers, contract auditors, price analysts, quality assurance personnel, engineers, and legal and small business specialists.

Final cost objective: A cost objective that has allocated to it both direct and indirect costs and, in the contractor's system, is one of the final accumulation points.

Fixed price: Refers to a family of pricing arrangements whose common discipline is a ceiling beyond which the Government bears no responsibility for payment. In the case of a firm-fixed-price arrangement, the agreed-to price is not subject to any adjustment by reason of the contractor's cost experience in the performance of the contract.

Formal advertising: (See sealed bidding.)

Forward pricing arrangement: An understanding negotiated between a contractor and the Government to make certain rates (e.g., labor, indirect, and material usage) available for use during a specified period of time in pricing contracts or contract modifications. The understanding is put in writing.

Full and open competition: The process by which all responsible offerors are allowed to compete. Available competitive procedures include sealed bids, competitive proposals, combination of competitive procedures (e.g., two-step), and other competitive procedures (e.g., A-E).

General and administrative: Indirect expenses, including a company's general and executive offices, executive compensation, the cost of staff services such as legal, accounting, public relations, financial, and similar expenses and other miscellaneous expenses related to the overall business.

Guaranteed loan: The guaranteed loan is essentially the same as other loans made by financial institutions. Funds are distributed, collected, and administered by the lending institution. Government funds are not involved except for the purchase of the guaranteed portion of the loan for the settlement of losses.

Incentive arrangement: A negotiated pricing arrangement that structures a series of relationships designed to motivate and reward the contractor for performance in accordance with the contract specification. In fixed-price incentive arrangements, the structure involves the negotiation of a target cost, target profit, target price, ceiling price, and sharing (or adjustment) formula for costs incurred under or over the target cost. In cost-reimbursement incentive arrangements, the structure involves the negotiation of a target cost, target fee, minimum and maximum fees, and sharing formula; or in the case of award fee arrangements, the payment of a fee (beyond the negotiated base or fixed fee) tied to criteria that are susceptible only to subjective measurement and evaluation.

Incremental funding: The obligation of funds to a contract containing a total price or estimated cost, in periodic installments against prescribed performance goals or objectives.

Index numbers: Ratios, usually expressed as percentages, indicating changes in values, quantities, or prices. Typically, the changes are measured over time, each item being compared with a corresponding figure from some selected base period.

Indirect cost: Any cost not directly identified with a single final cost objective but identified with two or more final cost objectives or with at least one intermediate cost objective. Also referred to as overhead or burden.

Indirect cost pool: A grouping of incurred costs identified with two or more cost objectives but not specifically identified with any final cost objective.

Invitation for bids: The solicitation document used in sealed bidding and in the second step of two-step sealed bidding.

Job order cost system: One in which a contractor accounts for output and costs incurred by specifically identifiable physical units. A job order may cover the production of one unit or represent a composite of a number of identical units.

Learning curve: A tool of calculation used primarily to project resource requirements, in terms of direct manufacturing labor hours or the quantity of material (for this purpose, usually referred to as an improvement curve) required for a production run. Used interchangeably with the term *improvement curve*, the concept of a learner's curve was adopted from the observation that individuals who perform repetitive tasks exhibit a rate of improvement due to increased manual dexterity. Learning or improvement curve theories include the following:

- *The Boeing or unit curve theory:* As the total quantity of units produced doubles, the cost per unit decreases by some constant percentage (the rate of learning).

- *The Northrop or cumulative average theory:* As the total quantity of units doubles, the average cost per unit decreases by some constant percentage (the rate of learning).

Letter contract: A written preliminary contractual instrument that authorizes the immediate commencement of activity under its terms and conditions, pending definitization of a fixed-price or cost-reimbursement pricing arrangement for the work to be done. Must specify the maximum liability of the Government and be superseded by a definite contract within a specified time. Not to be used except when a written determination is made that no other type of contract is suitable.

Market analysis: Refers to the process of analyzing prices and trends in the competitive marketplace for the purpose of comparing product availability and offered prices against market alternatives and establishing the reasonableness of offered prices.

Market data: Any information concerning price, quality, or availability of products in a particular market. Includes information obtained from market surveys, price quotes, newspapers, trade journals, and other sources. Such data are used to establish the reasonableness of an offered price.

Market survey: Refers to attempts to ascertain whether other qualified sources capable of satisfying the Government's requirement exist. This testing of the marketplace may range from written or telephone contact with knowledgeable federal and non-federal experts regarding similar or duplicate requirements, and the results of any market test recently undertaken, to the more formal sources – sought announcements in pertinent publications (e.g., technical/scientific journals or the Commerce Business Daily), or solicitations for information or planning purposes.

Marketplace: The commercial world; the realm of business, trade, and economics; the environment in which buyers and sellers bargain to achieve their separate and mutual ends.

Methods of procurement: The procedures followed to translate requirements into contracts. The Government uses two major methods of procurement: competitive and other than competitive . Competitive procedures may be sealed bidding or competitive proposals. Other than competitive procedures are used in accordance with statutory authorities.

Negotiation: A bargaining process between two or more parties, each with its own viewpoints and objectives, seeking to reach a mutually satisfactory agreement on, or settlement of, a matter of common concern.

Negotiation objectives: A range of goals, including desired costs or prices, which Government analysis indicates as the limits within which fair and reasonable contract provisions can be negotiated. These objectives should summarize all Government positions and assumptions relevant to price and other factors.

Overhead: (See indirect cost.)

Partial payment: A payment authorized under a contract, made upon completion of the delivery of one or more complete units (or one or more distinct items of service), called for, delivered, and accepted by the Government under the contract. Also a payment made against a termination claim upon prior approval before final settlement of the total termination claim.

Price: A monetary amount given, received, or asked in exchange for property or services, expressed in terms of a single item or unit of measure for such property or services.

Price analysis: The process of examining and evaluating a prospective price without evaluation of the separate cost elements and profit of the individual offeror whose price is being evaluated. It may be accomplished by a comparison of submitted quotations, a comparison of quotations with market prices of the same or similar items, a comparison of price quotations and contract prices with past prices or current quotations for the same or similar items, the use of yardsticks (dollars per pound, for instance), or a comparison of proposed prices with independently developed Government estimates.

Pricing: The process of establishing the amount or amounts to be received or paid in return for providing goods and performing services.

Pricing arrangement: An agreed-to basis between contractual parties for the payment of amounts for specified performance. Usually expressed in terms of a specific cost-reimbursement or fixed-price type arrangement.

Price negotiation memorandum: The document that tells the story of the negotiation. It is a sales document that establishes the reasonableness of the agreement reached with the successful offeror. It also is the permanent record of the decisions the negotiator made in establishing that the price was fair and reasonable. Called the PNM.

Probability: A probability is a number between 0 and 1, inclusive, representing the chance or likelihood that an event will occur. A probability of 0 means that the event is impossible, while a probability of 1 means that the event is certain to occur. A probability may also be stated as a percentage (". . . there is a 50 percent chance of this happening") or as an odds ratio (". . . there is a 3 to 2 chance of this happening"). The concept of probability assumes two things: an average over a long series of possibilities for an event to occur, and no ordering of events.

Process cost system: One in which a contractor accounts for output by the process that is employed continuously to manufacture or produce an end-item. At the end of an accounting period, the costs incurred for a process are assigned to the units (both complete and incomplete) that the process has produced or is producing.

Profit: Generally characterized as the basic motive of business enterprise; on occasion referred to as "the wages of risk." In contract pricing, profit represents a projected or known monetary excess realized by a producer or performer after the deduction of cost (both direct and indirect) incurred or to be incurred in the performance of a job, task, or series of the same.

Profit center: A discrete, organizationally independent segment of a company, which has been charged by management with profit and loss responsibilities.

Profit objective: That part of the estimated contract price objective or value that the contracting officer concludes is appropriate for the procurement at hand. Where cost analysis is undertaken, a profit objective should be developed. Developed, that is to say, after a thorough review of proposed contract work and all available knowledge regarding an offeror as well as an analysis of the offeror's cost estimate, and a comparison of it with the Government's estimate or projection of cost.

Progress payment: A payment made as work progresses under a contract on the basis of percentage of completion accomplished, or for work performed at a particular stage of completion.

Prospective pricing: A pricing decision made in advance of performance, based on analysis of comparative prices, cost estimates, past costs, or combinations of such considerations.

Public Law 87-653: Generally referred to as the "Truth in Negotiations Act." Created in law the requirement for the submission either actually or by specific identification in writing of cost or pricing data and certification of their accuracy, completeness, and currency for the award of any negotiated contract expected to exceed $100,000. Certain exceptions apply that are tied to adequate price competition or other conditions reflecting a competitive marketplace.

Reasonable cost: A cost is reasonable if, in its nature or amount, it does not exceed what would be incurred by an ordinarily prudent person in the conduct of competitive business.

Request for proposals: A solicitation document used in other than sealed bid procurements. When an RFP so states, the Government reserves the right to award a contract based on initial offers received without any written or oral discussion with offerors.

Request for quotations: A solicitation document used in other than sealed bid procurements. An RFQ is a request for information. Quotes submitted in response to it are not offers that the Government may accept without some confirmation or discussion with offerors.

Request for technical proposals: The solicitation document used in the first step of two-step sealed bidding.

Retroactive pricing: A pricing decision made after some or all of the work specified under contract has been completed, based on a review of contractor performance and recorded cost data.

Risk: An assumption of possible monetary loss or gain in light of the job or work to be done. One of the elements to be considered in the negotiation of a fair and reasonable price, as well as in determining the type of contract under which performance will occur.

Sampling: A method of obtaining statistics from a large body of data without resorting to a complete census. Two broad methods of selecting samples are probability sampling (in which sample units are selected according to the law of chance) and nonprobability sampling (in which personal choice, expert judgment, or some other nonprobabilistic rationale is used to select sample units).

Sealed bid: A method of contracting that uses competitive bids, public opening of bids, and awards. A latter-day version of what used to be known as formal advertising, similar to but not the same as that method. Shares equal billing with competitive proposals.

Should cost: A concept that holds that the objective of cost analysis and contract pricing is to price on the basis of what it should cost the offeror to produce, assuming reasonable economy and efficiency of operation; an attempt to minimize the ill effects of cost-based pricing with its tacit acceptance of will-cost as a standard.

Should-cost team: An implementation of the should-cost concept that employs an integrated team of Government procurement, contract administration, audit, and engineering representatives to conduct a coordinated, in-depth cost analysis at the contractor's plant. Its purpose: to identify uneconomical or inefficient practices in the contractor's management and operations, to quantify the findings in terms of their impact on cost, and to develop a realistic price objective for negotiation that reflects the outcome of the should-cost effort.

Single source: Characterized as one source among others in a competitive marketplace which, for justifiable reason (e.g., immediate or past experience, or current contractual involvement), is found to be most advantageous for the purpose of contract award. (Sometimes used interchangeably with the term *sole source*.)

Small purchase: A procurement action whose aggregate amount does not exceed a prescribed dollar value.

Small purchase procedures: The methods prescribed for making small purchases using imprest funds, purchase orders, and blanket purchase agreements.

Sole source: Characterized as the one and only source regardless of the marketplace, possessing a unique and singularly available performance capability for the purpose of contract award. (Sometimes used interchangeably with the term *single source*.)

Standard cost: A cost determined to represent an expected value; a goal or baseline that is used to expedite the costing of transactions, determined from historical experience or contrived from the best information available. Excepting costs attributable to precise and highly predictable operations, actual costs will almost always vary from standard costs due to factors that affect performance, like employee fatigue, unforeseen interruptions, and other delays.

Subsystem: A subset of subassemblies or devices or an individual unit of hardware that constitutes a defined part of a system (e.g., the avionics of an aircraft system, the fire control mechanisms of a ship system, the transmission/receiving elements of an electronic system).

Sunk cost: A cost that is not recoverable and has little or no foreseeable future benefit.

Supplemental agreement: A modification to an existing contract that is accomplished by the mutual action of the parties.

System: A group of subassemblies or devices or individual units of hardware (e.g., subsystems) that collectively meet or serve the total performance requirements of one or more defined functions (e.g., an aircraft system, a ship system, a land vehicle system).

Technical analysis: An evaluation of functions that cause costs to occur. May be done by any one, but usually by engineering and technical personnel. Vitally important to understanding cost projections as they relate to the job to be done. For example: technical analysis can provide an informed and useful opinion about the validity of projections for direct materials and usage factors; about scrap and its relationship to the use of hand, semiautomatic, or automatic operations; about the number and types of workers it takes to do a job; and about differences between the estimated labor mix and planned operations.

Value analysis: A systematic and objective evaluation of the function of a product and its related cost. The analyst evaluates the product characteristics in terms of aesthetics, utility, and demand. As a pricing tool, value analysis provides insight into the inherent worth of a product.

Variable cost: A cost that changes with the rate of production of goods or the performance of services. As distinguished from *fixed* costs (which do not change with the rate of production or performance), there may be *semivariable* costs (neither entirely fixed nor variable) and *variable* costs as defined here.

Weighted guidelines method: A technique the Government uses to insure consideration of the relative value of appropriate profit factors in establishing a profit objective and conducting negotiations. Also used as a basis for documenting and explaining the final pricing agreement reached between buyer and seller. Appropriate profit factors include contractor's effort, contractor's cost risk, facilities investment, special factors such as productivity, independent development, and other.

Will-cost: A conclusion that much contract pricing is based on the submission and evaluation of what an offeror estimates it will cost to do the job in a specified future period. As a concept, it is the opposite of should-cost. Cost or pricing data should be evaluated for their application to a projection of future costs, as well as whether or not these data may be perpetuating past inefficiencies.

INDEX

INDEX

– A –

accounting analysis, 1-9, 1-10
accounting systems, 1-12, 3-5, 3-8, 3-9, 5-50, 5-51, 6-28, 7-1
acronyms, A-1, A-2
actual costs, 1-11, 1-14, 3-8, B-1
adequate price competition, 2-10, 3-44, 3-45
administrative contracting officer (ACO), 1-6, 1-12, 3-35, 3-37, 3-39, 3-40, 5-9, 6-33, 8-6, 8-7, 8-22, 8-24
allocability, 1-14, 3-5, 3-47, 6-28, 6-32, 6-33, B-1
allowability, 1-14, 3-5, 6-32, 6-33,B-1
analysis, see
  accounting analysis
  cost analysis
  price analysis
  technical analysis
audit, B-1
auditor, 1-5, 1-10, 1-12, 1-14, 3-7, 3-10, 5-9, 6-33, 8-7, 8-22, 8-24, 10-10, B-2
award fee, 1-25, 1-26

– B –

basic agreement, 1-12
basic ordering agreement (BOA), 1-12
billing rates, 10-10
bill of materials, 5-5, 5-6, 5-7, B-2
Boeing theory, 3-29, 3-30, B-6
burden, 6-2
buyer, 1-3, 2-3, 2-8

– C –

cancellation charges, 10-20
catalog, 9-2, 9-22
catalog prices
  see established catalog or market prices
ceiling price, 1-11, 1-14, 5-6, 10-8
central tendency measures, 3-15, 3-16
certificate of current cost or pricing data, 2-8, 3-40
certified cost or pricing data
  see cost or pricing data
change orders, 10-2, B-2
Changes clause, 1-13, 10-2, 10-3
chi-square test, 3-24
citing higher authority, 8-17
collaboration, 8-18
commercial items, 2-9, 2-11, 2-12, B-2
common items (terminations), 10-19
comparison method of estimating, 3-11, 3-12
competition, 1-8, 1-9, 1-19, 1-32, 1-33, 1-34, 2-1 through 2-11, 2-17, 3-2, 3-3, 4-1, 4-2, 5-50, 8-1, 8-2, B-1
competitive range, 2-16, 8-2, 8-3, B-2
complexity, 3-50, 5-49
computational analysis, 7-7 through 7-12
computers, 3-33, 8-26
constructive changes, 10-4, 10-5, B-3
contingencies, 3-7, 3-50, B-3
contract cost principles
  see cost principles
contract pricing, 1-4, B-3
contract pricing proposal, 3-34, B-3
contracting officer, 1-3, 1-4, 1-10, 3-34, 3-35, 8-6, 8-21, 8-22, B-3
contractor cost data reporting (CCDR) system, 10-28
contractor effort, 4-4
contractor risk
  see risk
contractor's catalog, 9-22
contractor's pricing system, 9-14
control mechanisms, 1-31
controlling indirect costs, 6-23 through 6-26
correlation, 3-24
cost, 1-11, 2-3, 3-2
cost accounting, 3-7, 3-8, 3-9, 3-10, 6-28, B-3
cost accounting standards (CAS), 3-6, 3-8, 3-46, 5-59,7-1, 10-24
Cost Accounting Standards Board (CASB), 3-8, 3-46, 6-33
cost accounting systems, 3-7, 5-32
cost analysis, 1-3, 1-9, 1-10, 1-33, 2-8, 2-9, 2-16, 3-3, 3-5, 3-6, 3-7, 3-43, 3-44, 4-1, 8-26, 9-27, B-3
cost analysis reports, 4-1, 8-25, 8-26
cost-based prices, 3-3, 3-11
cost (CR) contract, 1-29
cost data
  see cost or pricing data
cost estimating, 3-10 through 3-14, 3-44, 10-27, B-4
cost estimating relationships (CERs), 2-9, 3-32, 3-33, 3-34
cost models, 3-33, 3-34

cost objective, B-4
cost or pricing data, 1-9, 1-12, 2-8, 2-10, 2-11, 2-16, 2-17, 3-14, 3-15, 3-35, 3-36, 3-43 through 3-46, 6-17, 6-18, 8-15,9-3, 9-25, 10-13, B-4
cost-plus-award-fee (CPAF) contract, 1-25, 1-26
cost-plus-fixed-fee (CPFF) contract, 1-12, 1-26, 1-27, 1-28
cost-plus-incentive-fee (CPIF) contract, 1-22, 1-23, 1-24
cost-plus-percentage-of-cost (CPPC) contracting, 3-3
cost-plus theory of price, 3-3
cost principles, 3-5, 3-46 through 3-48
cost-reimbursement contract, 1-10, 1-11, 3-5, 3-6, B-4
cost risk, 4-11 through 4-14
cost sharing, 1-29
cumulative average theory, 3-30, B-6

– D –

data, 9-29 through 9-35
DCAA Form 1, 10-16
DD Form 1423, Contract Data Requirements List, 9-29 through 9-36
DD Form 1547, Weighted Guidelines Profit/Fee Objective, 4-17, 8-32
DD Form 1597, Contract Close-out Check-List, 10-15
DD Form 1861, Contract Facilities Capital and Cost of Money, 4-14
DD Form 1921-1, Functional Cost-Hour Report, 10-28
DD Form 1921-3, Plant-Wide Data Report, 10-28
defective pricing, 3-46, 10-13, B-4
Defense Contract Audit Agency (DCAA), 3-15, 3-28, 6-33, 7-2, 10-14
delivery rate, 9-21
descriptive statistics, 3-15
detailed estimating, 3-12
direct costs, 3-5, 4-7, 5-1 through 5-67, 6-2, B-4
direct materials, 3-52, 5-1, 5-2
disclosure statements, 10-24, B-4
disputes, 10-4
documenting price analysis, 2-16, 8-19, 8-20, 8-21
documenting the target profit objective, 4-19, 4-20
DoD FAR Supplement (DFARS), 1-1, 1-3, 4-2, 4-5
dollar value, 3-48

– E –

economic price adjustment, 1-21, 1-22, B-5
effective competition, 2-2, 2-11
effective price competition, 1-33, 2-5, 2-6, 2-7, 2-10, 3-3, 8-4
engineering labor, 4-5, 5-46 through 5-56
engineering overhead, 4-9, 6-8 through 6-11, 6-29
equitable adjustments, 10-3, 10-24
established catalog or market prices, 2-11, 2-12, 2-17, 3-44, 3-45, 9-3, 9-6, B-5
estimating by comparison, 3-11
estimating techniques, 3-15 through 3-34
evaluating spare parts prices, 9-23
exemption, catalog or market price, 9-2 through 9-10
extracontractual factors, 1-31

– F –

facilities, 1-29
facilities capital, 4-14
factfinding, 1-6, 8-8
factory labor, 5-29
factory overhead, 6-26 through 6-29
fair and reasonable price, 1-9, 2-1, 2-5, 2-6, 2-7, 2-8, 2-11, 3-3, 3-6, 3-7, 8-4, 8-19, 9-12, B-5
Federal Acquisition Regulation (FAR), 1-1, 1-3, 3-5, 3-11, 3-34, 3-35, 3-37, 3-39, 3-40, 4-2, 5-11, 5-59, 5-66, 6-3, 6-4, 6-28, 10-23
Federal excise tax, 5-59, 5-65
fee
  see profit or fee
field pricing, 2-16, 3-37, 3-44, 8-6, B-5
final cost objective, defined, 6-2, B-5
final overhead rates, 10-10
final pricing, 1-16, 10-15, 10-16
firm-fixed-price (FFP) contract, 1-9, 1-12, 1-13, 2-6, 2-9
fixed-price contract, 1-10, 1-11, B-5
fixed-price contract with economic adjustment, 1-12
fixed-price contract with redetermination (FPR), 1-12, 1-21, 1-30
fixed-price incentive (FPI) contract, 1-16, 1-22, 1-30, 10-17
fixed-price incentive (firm target) (FPIF) contract, 1-14, 1-26
fixed-price incentive (successive targets) (FPIS) contract, 1-12, 1-18
forecasting, 3-21, 3-25 through 3-28
foreign military sales (FMS), 9-26 through 9-29
formal advertising
  see sealed bidding
formula pricing, 9-15 through 9-20
forward pricing, 10-9, B-5
F-statistic, 3-24

full and open competition
  see competition
functional organization, 6-25

– G –

gamesmanship, 8-16
General Accounting Office (GAO), 1-5, 1-8, 3-6, 10-14
general and administrative (G&A) expense, 3-8, 6-2, 6-14 through 6-17, 6-29, B-6
general management expenses, 4-10
general public, 2-11, 2-12, 3-44
glossary, B-1 through B-10
"goodness of fit," 3-24
Government catalogs, 2-14
Government estimates, 2-14, 2-16, 2-17
graphic analysis, 7-7 through 7-12
graphic correlation, 6-22
graphic review, 5-53, 5-54

– H –

historical costs, 3-5, 3-10, 5-33, 5-42
hypothesis testing, 3-23 through 3-25

– I –

identification of data, 3-35, 3-36
imperfect competition, 2-2, 2-6
indefinite delivery contract, 1-12
independent cost estimate (ICE), 2-7, 2-12
independent development, 4-15
independent research and development and bid and proposal (IR&D/B&P) costs, 6-30
indices, 1-21, 1-22, 3-18 through 3-21
indirect cost behavior, 6-19 through 6-23
indirect cost pools, 6-18, 6-19
indirect cost projections, 6-32, 6-33
indirect costs, 3-5, 3-32, 4-6, 4-7, 6-1 through 6-33, 10-27
individuality, 8-17
interim price adjustments, 10-12
interorganizational transfers, 5-2, 5-10
inventory pricing methods, 5-9
inventory position, 3-49
invitation for bids (IFB), 1-9, B-6

– J –

J. H. Williams method, 6-22
"job order" system, 3-9, 3-31, 3-32, B-6

– L –

labor, 5-29 through 5-45
labor base, 6-29
labor estimates, 5-41 through 5-45
labor-hour (L-H) contract, 1-30, 1-31
labor-rate analysis, 3-13
labor rates, 7-1 through 7-12
labor standards, 5-33 through 5-39, 5-42 through 5-44
learning curve, 3-28, through 3-34, 5-7, 5-40, 5-52, 5-53, B-6
least squares method, 6-22, 6-23, 7-10
letter contract, 1-12, 3-6, B-6
level of effort, 5-53
logic chart (exemptions), 9-9, 9-10
loss, 1-11
loss situation (terminations), 10-22

– M –

make-or-buy program, 5-12
manpower costs, 6-25, 6-26
manufacturing labor, 4-5 through 4-11
manufacturing overhead, 4-9, 4-10, 6-11 through 6-14
market prices
  see established catalog or market prices
massive terminations, 10-22
material costs, 2-13, 4-4, 4-5, 5-2, 5-3, 5-7, 5-10 through 5-28
material overhead, 5-10, 6-6, 6-7, 6-8
measures of central tendency, 3-15, 3-16
measures of variability, 3-16, 3-17
MIL-STD-1567A, Work Measurement, 3-4, 5-39
monitoring indirect costs, 10-27
monopoly, 2-2, 2-3
monopsony, 2-2, 2-3
multi-item contracts, 8-14, 8-15

– N –

negotiating team, 8-6, 8-21
negotiation, 1-7, 1-9, 1-11, 3-2, 3-6, 3-7, 3-14, 3-47, 4-2, 8-12, 8-19, B-7
negotiation objective, 8-8, 8-24, B-7
negotiation spokesman, 8-7
new standards, 10-25
no-cost changes, 10-8
noncompetitive procurement, 2-1, 2-9, 3-43
noncompetitive procurement identification code, 9-22
noncompliance, 10-26
nonrecurring costs (FMS), 9-28
Northrop theory, 3-30, B-6

– O –

obsolescence, 5-6, 10-20
oligopoly, 2-2
oligopsony, 2-2, 2-3
options, 10-11
other costs, 5-59 through 5-66

other factors, 4-15 through 4-19
overhead, 3-13, 6-2 through 6-18, 6-24 through 6-29

-P-

parametric relationships, 2-7, 3-6
perfect competition, 2-2
performance evaluation board, 1-26
policy in negotiations, 8-17
postaward pricing actions, 10-1 through 10-28
precedent, 8-18
prenegotiation, 1-9, 2-16, 8-11, 8-12, 8-13, 8-18
preproduction costs, 5-59, 5-60
preservation packaging and packing, 9-21
price analysis, 1-3, 1-4, 1-9, 1-10, 1-32, 2-7, 2-8, 2-9, 2-12, 2-16, 2-17, 3-6, 8-20, B-7
price analysis report, 8-20
price comparison, 2-12, 2-13, 2-17
priced bill of materials
  see bill of materials
price negotiation, 3-45, 4-2, 4-3, 8-1, 8-4, 8-5, 8-9, 8-12, 8-19
price negotiation memorandum (PNM), 8-15, 8-20, 8-22, 8-25, 8-27 through 8-33, 10-14, B-8
price objectives, 8-12, 8-13
prices set by law or regulation, 3-44, 9-7
price standards, 2-4, 3-3
price theory, 2-1, 2-2
pricing arrangements, 1-10, 1-11, 1-12, 1-31, 2-9, 3-6, 9-22, B-8
pricing data
  see cost or pricing data
pricing of changes, 10-3, 10-5 through 10-9
pricing of data items, 9-30
pricing proposal
  see contract pricing proposal
pricing specialist, 8-6
probability, 3-21, 3-22, B-8
"process" system, 3-9, 5-32, 5-33, B-8
procuring contracting officer (PCO), 8-6, 8-7, 8-22
production engineering ratio, 5-53
production leadtimes, 9-21
productivity, 4-15
profit analysis, 4-1 through 4-20
profit and competition, 4-1, 4-2
profit objective, 2-9, 4-1, 4-2, 4-19, B-8
profit or fee, 1-11, 1-13, 1-15, 2-3, 3-3, 4-1, 4-3, 8-27, 10-9, 10-23, 10-24, B-5, B-8
proposal, 1-5, 1-6, 1-9, 3-2
prospective pricing, 1-33, 1-34, B-8
purchased parts, 5-2, 5-5, 5-20 through 5-24
purchase request (PR), 2-12, 2-14, 2-15

-Q-

quantitative measurement tools, 3-15 through 3-34

-R-

ratio of business, 3-49
raw materials, 5-2, 5-4, 5-17, 5-18, 5-19
realism, 2-9, 3-6, 3-7
reasonableness of price, 1-14, 1-34, 2-3, 2-6, 2-11, 2-12, 3-47, 3-48, 4-1, B-8
recommendations, 8-24
recovery of nonrecurring costs (FMS), 9-28
regression analysis, 3-22, 3-24, 3-25
relationships with contractors, 8-17
request for proposals (RFP), 1-9, 2-10, 2-11, 8-22, B-9
request for quotations (RFQ), 2-10, B-9
requests for information, 8-23
requirement, 1-9, 2-5, 3-2
residual inventory, 10-17
retroactive pricing, 1-33, B-9
returns, 10-20
revision of schedules, 10-8
rework, 5-5, 5-41
risk, 4-11 through 4-14, B-4, B-9
round-table estimating, 3-11
royalties, 5-66

-S-

sampling, 3-22, 3-23, B-9
schedule changes, 10-8
scrap, 3-52, 5-4, 5-6, 5-7, 5-21, 10-20
sealed bidding, 1-6, 1-9, 1-12, 2-5, 2-7, 3-2, 8-1, B-9
selling expense, 6-31
services labor, 4-5
settlement costs, 10-22
sharing arrangements, 1-13, 1-15
should-cost analysis, 3-4, 3-53, B-9
should-cost team, B-9
small purchases, 2-16, B-9
solicitation, see
  invitation for bids
  request for proposals
sources of cost or pricing data, 3-14, 3-15
spare parts, 2-14, 9-11 through 9-25
special catalogs, 9-20
special factors, 4-14 through 4-19
special tooling, 10-20, 10-21
specifications, 1-9, 2-5, 3-2
spoilage, 5-4, 5-6
standard commercial items, 5-14
standard costs, 3-5, 3-8, 3-9, 3-46, B-10

Standard Form (SF) 1411, Contract Pricing Proposal Cover Sheet, 3-11, 3-35 through 3-44, 5-11, 6-2, 6-3, 8-21, 8-23, 8-26, 8-27, 9-13
Standard Form (SF) 1412, Claim for Exemption From Submission of Certified Cost or Pricing Data, 3-35, 9-2 through 9-8, 9-25
Standard Form (SF) 1435, Settlement Proposal (Inventory Basis), 10-23
Standard Form (SF) 1436, Settlement Proposal (Total Cost Basis), 10-23
Standard Form (SF) 1437, Settlement Proposal for Cost-Reimbursement Type Contracts, 10-23
standard times, 5-34 through 5-41
standby cost method, 6-22
startup costs, 5-59, 5-60
statistical analysis, 5-5, 5-6
statutory profit limitations, 4-20
subcontracts, 5-9 through 5-13
substantial quantities, 2-11, 2-12, 3-44, 9-4
sunk cost, B-10
supplemental agreement, B-10
system (defined), B-10

– T –

target cost, 1-14, 1-15
target price, 1-14, 1-15, 5-6
target profit, 1-14, 1-15, 4-19
taxes, 5-65
teamwork, 6-33, 8-6, 8-21
technical analysis, 1-9, 1-10, 3-51, 3-52, B-10
technical specialists, 8-22
termination contracting officer (TCO), 10-21
termination inventory, 10-18
termination pricing, 10-21, 10-22
testing for competition, 2-9,
time-and-materials (T-M) contract, 1-30
tooling, 4-5, 5-57, 5-58, 10-20
total cost (defined), 6-2
tracking costs, 8-15
Truth in Negotiations, 3-6, B-8
t-statistic, 3-24
two-step sealed bidding, 1-9

– U –

uncertainties, 1-10, 1-11, 1-18, 3-5, 3-7, 3-49, 3-50, 3-51
unit curve theory, 3-29
unit price integrity, 9-12
unit prices, 9-12, 9-21

– V –

value, 1-33, 2-6, 2-8, 2-9
value analysis, 2-15, 2-17, 8-12, B-10
variability measures, 3-16 through 3-18
variable cost, B-10
variances, 3-9, 5-7
visual analysis, 2-15
volume projections, 6-24, 6-31
voluntary changes, 10-25

– W –

wage rate projections, 7-3 through 7-12
wage rates, 7-1 through 7-12
warranties, 3-7, 9-25
weighted guidelines, 4-2 through 4-20, B-10
will-cost, 3-4, B-10
work measurement, 3-4, 5-39
worth, 2-8, 2-9
written or oral discussions, 1-9, 8-2, 8-3

– X –

x^2 test, 3-24

– Y –

yardsticks, 2-7

*U.S. GOVERNMENT PRINTING OFFICE: 1986--155-280/NP